



## REGION II RST2 HEALTH AND SAFETY PLAN EMERGENCY RESPONSE / REMOVAL ASSESSMENT (Revised 22 Feb 2010)

**TDD No.:** TO-0017-0208

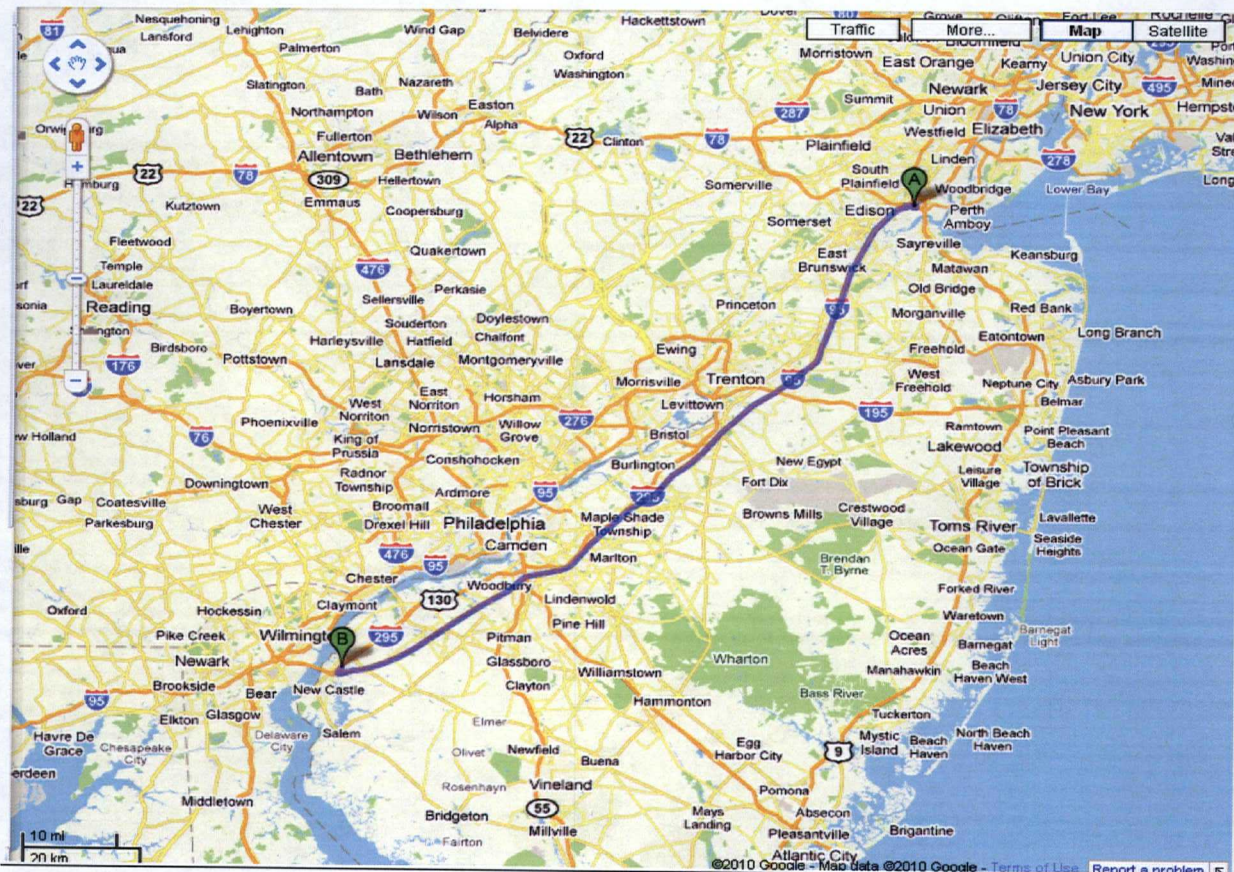
**Site Name:** Liberty Plastics Site Assessment

**Site Address:** Street No.: 431 South Pennsville-Auburn Road  
City: Carneys Point  
County/State: Salem/New Jersey

### Directions to Site:

1. Head northeast on King Georges Rd/King Georges Post Rd toward New St. (1.8 m, 4 mins)
2. Take the ramp to I-95 S/New Jersey Turnpike South. (0.4 mi)
3. Continue on I-95 South (27.8 mi)
6. Continue on NJ Turnpike South (Partial Toll Road) (59.5 mi)
7. Take NJ – 140 exit towards Penns Grove/Deepwater/Salem County 540 (0.2 mi)
8. Turn right at NJ-140 W (69 ft)
9. Take the first right onto County Road 551 N/S Pennsville Auburn Rd (0.7 mi)

*Destination is 90.4 miles and about 1 hour 36 minutes*



*\*\*This map is subject to Google's Terms of Service, and Google is the owner of rights therein.*

### **Historical/Current Site Information:**

The Liberty Plastics Site (the Site) is located at 431 South Pennsville-Auburn Road, in Carneys Point, New Jersey. The property was previously called Budd Chemical – which was a plastics material and resin manufacturing facility. The Site consists of an open warehouse on a 20 acre abandoned property. Based on the U.S. Environmental Protection Agency's (EPA's) investigation of the Site during the week of July 12, 2010, approximately 50 drums were discovered, as well as 30-40 smaller containers. Initial field screening characterization showed several drum contents to be highly acidic or basic in nature. A white powder-type material was found in various locations in the building, coated polymers were also found throughout the building. It is also presumed that building pipe insulations may also contain asbestos. An aboveground storage tank containing formaldehyde is also located outside the warehouse. EPA photos show lines that supply formaldehyde from the tank to the interior of the building. EPA is also concerned about a release occurring near the septic systems located on site.

On July 20, 2010, four RST 2 members and the EPA On-Scene Coordinator (OSC) conducted a reconnaissance and investigation of the Site. No entry was conducted in the on-site building; however based on the exterior reconnaissance, 18 soil sampling locations were selected by EPA and soil samples from these particular location were collected by RST 2 personnel at a depth of 0-3 inches below ground surface (bgs). All soil samples were collected using non-dedicated stainless steel scoops and bowls, and samples were collected for screening purposes only, without any additional Quality Assurance/Quality Control (QA/QC) samples. The soil samples were submitted for Target Compound List (TCL) volatile organic compound (VOC), semivolatile organic compound (SVOC), pesticide, Target Analyte List (TAL) metals and mercury (Hg), and Resource Conservation and Recovery Act (RCRA) Characterization analyses. Upon request of EPA, the samples were also further analyzed for formaldehyde.

### **RST 2 Scope of Work:**

The Removal action at the Site is scheduled to begin on April 18, 2011 and be completed in approximately two weeks. As part of the Removal Action, RST 2 is tasked with conducting air monitoring for organic vapors, LEL and oxygen using a MultiRAE; documenting all substantial events which occur at the Site into a logbook and include sketches illustrating the location of drums and other important points photodocumenting Site operation and provide photos to OSC 5 days after completions of field events and creating and maintaining a spreadsheet of all drums, labpacks and other waste generated on-site.

### **Three (3) S.M.A.R.T. Health and Safety Goals for the Project (Simple, Measurable, Actionable, Reasonable, & Timely):**

1. Work safely taking periodic breaks during hot weather conditions, especially working in PPE.
2. Attend ERRS health and safety meeting each morning and discuss any possible dangers on site.
3. Safely operate RST 2 vehicles while working long hours

**Incident Type:**

- ☐ Emergency Response
- ☐ Removal Assessment
- ☒ Removal Action - Start date: April 18, 2011
- ☐ Residential Sampling/Investigation
- ☐ PRP Oversight
- ☐ Other (Fast Track Assessment)

**Location Class:**

- ☐ Industrial
- ☒ Commercial - Start date: April 18, 2011
- ☒ Urban/Residential - Start date: April 18, 2011
- ☐ Rural

U.S. EPA OSC: Tom Budroe

Original HASP: Yes or No: Yes

Lead RST2: Mark Conover

Date of Initial Site Activities: 04 / 18 / 2011

Site Health & Safety Coordinator: Mark Conover

Site Health & Safety Alternate: N/A

**Response Activities/Dates of Response:**

**Emergency Response:**

- ☐ Perimeter Recon.
- ☐ Site Entry
- ☐ Visual Documentation
- ☐ Multi-Media Sampling
- ☐ Decontamination

**Assessment:**

- ☐ Perimeter Recon.
- ☐ Site Entry
- ☐ Visual Documentation
- ☐ Multi-Media Sampling
- ☐ Decontamination

**Removal Action:**

- ☐ Perimeter Recon.
- ☒ Site Entry : Start date: April 18, 2011
- ☒ Visual Documentation: Start date: April 18, 2011
- ☐ Multi-Media Sampling
- ☐ Decontamination

**Physical Safety Hazards to Personnel**

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Inclement Weather – Attach FLD02                     | <input checked="" type="checkbox"/> Heat – Attach FLD05               | <input type="checkbox"/> Cold – Attach FLD06                                      |
| <input type="checkbox"/> Confined Space – Attach FLD08                        | <input type="checkbox"/> Industrial Trucks – Attach FLD09             | <input type="checkbox"/> Manual Lifting – Attach FLD10                            |
| <input checked="" type="checkbox"/> Terrain – Attach FLD11                    | <input type="checkbox"/> Structural Integrity – Attach FLD13          | <input type="checkbox"/> Site Security – Attach FLD14                             |
| <input type="checkbox"/> Pressurized Containers, Systems – Attach FLD16       | <input type="checkbox"/> Use of Boats – Attach FLD18                  | <input type="checkbox"/> Waterways – Attach FLD19                                 |
| <input type="checkbox"/> Explosives – Attach FLD21                            | <input checked="" type="checkbox"/> Heavy Equipment – Attach FLD22    | <input type="checkbox"/> Aerial Lifts and Manlifts – Attach FLD24                 |
| <input type="checkbox"/> Elevated Surfaces and Fall Protection – Attach FLD25 | <input checked="" type="checkbox"/> Ladders – Attach FLD26            | <input type="checkbox"/> Excavations/Trenching – Attach FLD28                     |
| <input type="checkbox"/> Fire Prevention – Attach FLD31                       | <input type="checkbox"/> Demolition – Attach FLD33                    | <input checked="" type="checkbox"/> Underground/Overhead Utilities – Attach FLD34 |
| <input type="checkbox"/> Hand and Power Tools – Attach FLD38                  | <input type="checkbox"/> Illumination – Attach FLD39                  | <input checked="" type="checkbox"/> Storage Tanks – Attach FLD40                  |
| <input type="checkbox"/> Lead Exposure – Attach FLD46                         | <input type="checkbox"/> Sample Storage – Attach FLD49                | <input type="checkbox"/> Cadmium Exposure – Attach FLD50                          |
| <input checked="" type="checkbox"/> Asbestos Exposure – Attach FLD52          | <input type="checkbox"/> Hexavalent Chromium Exposure – Attach FLD 53 | <input type="checkbox"/> Benzene Exposure – Attach FLD 54                         |
| <input type="checkbox"/> Drilling Safety – Attach FLD56                       | <input checked="" type="checkbox"/> Drum Handling – Attach FLD58      | <input checked="" type="checkbox"/> Gasoline Contaminant Exposure – Attach FLD61  |
| <input type="checkbox"/> Noise – Attach CECHSP, Section 7                     | <input checked="" type="checkbox"/> Walking/Working Surfaces          | <input type="checkbox"/> Oxygen Deficiency  |
| <input checked="" type="checkbox"/> Unknowns in Tanks or Drums                | <input type="checkbox"/> Nonionizing Radiation                        | <input type="checkbox"/> Ionizing Radiation                                       |

## Biological Hazards to Personnel

- |   |  |
|---|--|
| <input type="checkbox"/> Infectious/Medical/Hospital Waste – Attach FLD 44 and 45 | <input checked="" type="checkbox"/> Non-domesticated Animals – Attach FLD43A     |
| <input checked="" type="checkbox"/> Insects – Attach FLD 43B                      | <input checked="" type="checkbox"/> Poisonous Plants/Vegetation – Attach FLD 43D |
| <input type="checkbox"/> Raw Sewage   | <input type="checkbox"/> Bloodborne Pathogens – Attach FLD 44 and 45             |

## Training Requirements

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> 40-Hour HAZWOPER Training with three days supervised experience | <input type="checkbox"/> 8-Hour Management or Supervisor Training in addition to basic training course |
| <input checked="" type="checkbox"/> 8-Hour Annual Refresher Health and Safety Training              | <input type="checkbox"/> Site Specific Health and Safety Training                                      |
| <input type="checkbox"/> DOT (CMV Training - ERV in Use)  | <input type="checkbox"/> Bio-Medical Collection and Response   |

## Medical Surveillance Requirements

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Baseline initial physical examination with physician certification | <input checked="" type="checkbox"/> Annual medical examination with physician certification |
| <input type="checkbox"/> Site Specific medical monitoring protocol (Radiation, Heavy Metals)           | <input type="checkbox"/> Asbestos Worker medical protocol                                   |

## Vehicle Use Assessment and Selection

Driving is one of the most hazardous and frequent activities for Weston Employees. As such, Weston Employees are required to adhere to established safe operating practices in order to maintain their eligibility to drive Weston owned, leased, or rented vehicles. Every person riding in a Weston vehicle, including passengers must maintain a commitment for a safe journey. This means being attentive while in the vehicle and helping the driver to notice hazards ahead of and around the vehicle and ensure that their presence does not distract the driver from safely operating the vehicle.

A high percentage of vehicle accidents occur when operating in reverse. Anytime a vehicle is operated in reverse, e.g., backing out of a parking area, if there are passengers, at least one of them are to assist the driver by acting as a guide person during the reverse movement or during other vehicle operation where it would be prudent to have a guide person(s) participate in the vehicle movement. When practical, the preferred parking method would be to back into the parking area.

At a minimum, each Weston Driver must:

- Possess a current, valid drivers' license
- Obey posted speed limits and other traffic laws
- Wear seat belts at all times while the vehicle is in operation
- Conduct a 360 degree inspection around the vehicle before attempting to drive the vehicle
- Report accidents / incidents immediately and complete a Notice of Incident (NOI)
- Keep vehicles on approved roadways (4WD doesn't guarantee mobility on unapproved surfaces)

All Region II RST personnel are experienced and qualified to drive RST fleet vehicles (Trailblazers, Suburbans, Cargo Van, and 10' x 12' Box Truck). However, in the event that vehicle rental is required, each person must take the time to familiarize themselves with that particular vehicle. This familiarization includes adjustment of the dashboard knobs/controls, mirrors, steering wheel, seats, and a 360 degree external inspection of the vehicle.

1. The following vehicles are anticipated to be used on this project:

- |  |  |
|--|--|
| <input type="checkbox"/> Car   | <input type="checkbox"/> Pickup Truck  |
| <input checked="" type="checkbox"/> Intermediate/Standard SUV<br>(e.g. Chevy Trailblazer, Chevy Tahoe, Ford Explorer, Ford Escape) | <input type="checkbox"/> Full Size SUV (e.g. Chevy Suburban, Ford Expedition, GMC Yukon) |

2. Are any on-site
- |  |  |
|--|--|
| <input type="checkbox"/> Minivan/Cargo Van (e.g. Chevy Uplander) | <input type="checkbox"/> Box Truck (Size: <u>15 ft</u> ) |
| <input type="checkbox"/> Emergency Response Vehicle (ERV)        | <input type="checkbox"/> Other _____                     |

considerations that should be noted:

- |  |   |  |   |
|--|---|--|---|
| <input checked="" type="checkbox"/> Working/Driving Surfaces | <input type="checkbox"/> Debris                             | <input checked="" type="checkbox"/> Overhead Clearance   | <input type="checkbox"/> Obstructions       |
| <input checked="" type="checkbox"/> Tire Puncture Hazards    | <input type="checkbox"/> Vegetation                         | <input checked="" type="checkbox"/> Terrain              | <input checked="" type="checkbox"/> Parking |
| <input type="checkbox"/> Congestion                          | <input type="checkbox"/> Site Entry/Exit Hazards            | <input checked="" type="checkbox"/> Local Traffic Volume | <input type="checkbox"/> Security           |
| <input checked="" type="checkbox"/> Heavy Equipment          | <input checked="" type="checkbox"/> Time/Length of Work Day | <input type="checkbox"/> Other:                          |   |

Do any of the considerations above require further explanation:

No

3. Was the WESTON Environmental Risk Management Tool completed in EHS? Yes

4. Are there any seasonal considerations that should be noted (e.g., Anticipated Snowy Conditions):

No

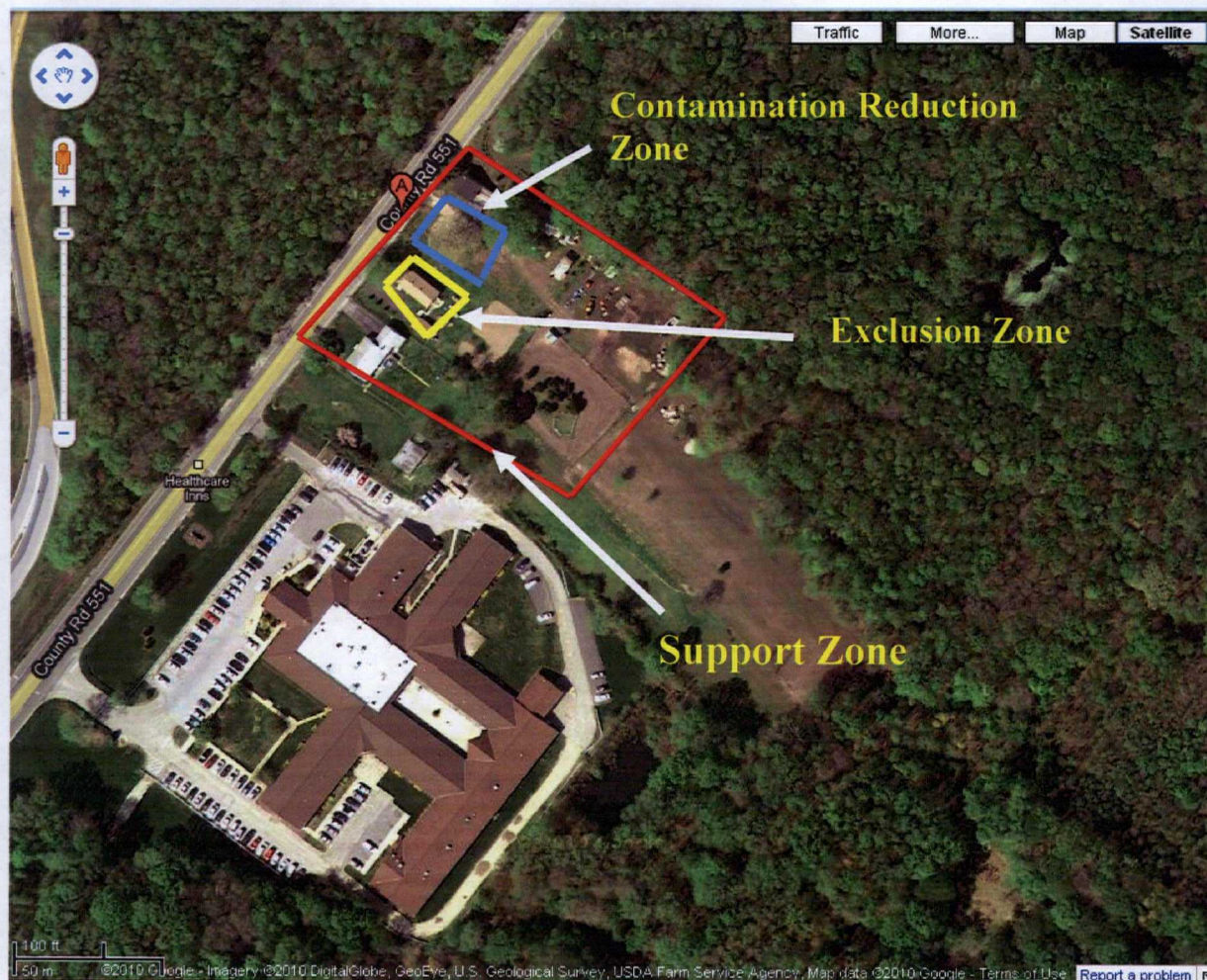
5. Is a Traffic Control Plan required? ☐ Yes ☒ No

## Chemical Hazards to Personnel

Physical Parameters	Chemical Contaminant Formaldehyde	Chemical Contaminant Zinc Sulphate Monohydrate	Chemical Contaminant Asbestos
Exposure Limits / IDLH Level	<u>0.75</u> ppm <u>      </u> mg/m <sup>3</sup> PEL <u>      </u> ppm <u>      </u> mg/m <sup>3</sup> TLV <u>20</u> ppm <u>      </u> mg/m <sup>3</sup> IDLH	<u>NA</u> ppm <u>      </u> mg/m <sup>3</sup> PEL <u>NA</u> ppm <u>      </u> mg/m <sup>3</sup> REL <u>NA</u> ppm <u>      </u> mg/m <sup>3</sup> IDLH	<u>      </u> ppm <u>0.1</u> fibers/cm <sup>3</sup> PEL <u>      </u> ppm <u>0.1</u> fibers/cm <sup>3</sup> TLV/REL <u>      </u> ppm <u>      </u> mg/m <sup>3</sup> IDLH
Physical Form (Solid/Liquid/Gas) Color	<u>      </u> Solid <u>      </u> Liquid <u>X</u> Gas <u>      </u> Colorless <u>      </u> Color	<u>X</u> Solid <u>      </u> Liquid <u>      </u> Gas <u>White powder/granules</u> Color	<u>X</u> Solid <u>      </u> Liquid <u>      </u> Gas <u>White or greenish (chrysotile), blue (crocidolite), or gray green (amosite) color</u>
Odor	Pungent, suffocating odor	Chloroform-like odor	Odorless
Flash Point Flammable Limits	<u>NA</u> Degrees F or C <u>73</u> % UEL <u>7</u> % LEL	<u>NA</u> Degrees F or C <u>NA</u> % UEL <u>NA</u> % LEL	<u>N/A</u> Degrees F or C <u>N/A</u> % UEL <u>N/A</u> % LEL
Vapor Pressure Vapor Density	<u>&gt; 1 atm</u> mm/Hg <u>1.04</u> Air = 1	<u>NA</u> mm/Hg <u>N/A</u> Air = 1	<u>0</u> mm/Hg (approx.) <u>N/A</u> Air = 1
Specific Gravity	<u>Unknown</u> Water = 1	<u>3.28</u> Water = 1	<u>Unknown</u> Water = 1
Solubility	Miscibility	30 %	Insoluble
Incompatible Materials	Strong oxidizers; alkalis and acids, phenols, urea. Pure formaldehyde has a tendency to polymerize. Reacts with HCL to form bis-Chloromethyl ether.	NA	N/A
Routes of Exposure	<u>X</u> Inh <u>X</u> Abs <u>X</u> Con <u>      </u> Ing	<u>X</u> Inh <u>X</u> Abs <u>X</u> Con <u>X</u> Ing	<u>X</u> Inh <u>      </u> Abs <u>X</u> Con <u>X</u> Ing
Symptoms of Acute Exposure	Irritation – eyes, nose, throat, respiratory system, lacrimation (discharge of tears), cough, wheezing, potential occupational carcinogen. Target organs are eyes and respiratory system.	May cause skin irritation, eye irritation, possible corneal burn, gastro-intestinal disturbance, irritation to nose and throat, skin dermatitis, eye conjunctivitis.	Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]
First Aid Treatment	Eye: Irrigate immediately Breathing: Respiratory support	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	Eye: Irrigate immediately Breathing: Fresh air
Ionization Potential	<u>10.88</u> eV	<u>NA</u> eV	<u>N/A</u> eV
Instruments for Detection	<u>X</u> PID w/ <u>11.7</u> Probe <u>X</u> FID <u>      </u> CGI <u>      </u> RAD <u>X</u> Det Tube <u>      </u> pH Other <u>FP 30 – Formaldehyde Gas Detector</u>	<u>      </u> PID w/ <u>10.6</u> Probe <u>      </u> FID <u>      </u> CGI <u>      </u> RAD Det Tube <u>      </u> pH Other	PID w/ <u>      </u> Probe FID <u>      </u> CGI <u>      </u> RAD <u>      </u> Det Tube <u>      </u> Other: <u>NIOSH 7400, 7402</u>

## Control Measures

Site Map with Work Zones:



### Work Zone Definitions:

Exclusion Zone - the area where contamination is either known or expected to occur and the greatest potential for exposure exists. The outer boundary of the Exclusion Zone, called the Hotline, separates the area of contamination from the rest of the site.

Contamination Reduction Zone (CRZ) - the area in which decontamination procedures take place. The purpose of the CRZ is to reduce the possibility that the Support Zone will become contaminated or affected by the site hazards.

Support Zone - the uncontaminated area where workers are unlikely to be exposed to hazardous substances or dangerous conditions. The Support Zone is the appropriate location for the command post, medical station, equipment and supply center, field laboratory, and any other administrative or support functions that are necessary to keep site operations running efficiently.

**Communications:**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Buddy System  | <input checked="" type="checkbox"/> Radio                       |
| <input type="checkbox"/> Air Horn for Emergencies | <input checked="" type="checkbox"/> Hand Signals/Visual Contact |

**Personnel Decontamination Procedures:**

- ☐ Wet Decontamination (procedures as follows)
- ☒ Dry Decontamination (procedures as follows)

Building entries will be conducted in Level B PPE, and possibly downgraded to Level C. Gross contamination will be removed prior to exiting from the exclusion zone. All contaminated PPE will be bagged and disposed of during the ongoing Removal Action.

**Equipment Decontamination Procedures:**

- ☒ None
- ☐ Wet Decontamination (procedures as follows)
- ☐ Dry Decontamination (procedures as follows)

Adequacy of decontamination determined by: Site Health & Safety Officer

**Personal Protective Equipment**

TASK TO BE PERFORMED	ANTICIPATED LEVEL OF PROTECTION	TYPE OF CHEMICAL PROTECTIVE COVERALL	INNER GLOVE OUTER GLOVE BOOT COVER	TYPE OF APR CARTRIDGE OR CANISTER
Oversight	Level B*	Saranex / Tyvek	Blue Nitrile, Green Nitrile, Latex	SCBA, Supplied Air
Oversight	Level C*	Tyvek	Blue Nitrile, Latex	P-100: Organic Vapor Cartridges
Oversight	Level D*	Cotton Coverall	Blue Nitrile, Latex	None

\* Levels of protection may be downgraded based on air monitoring readings and field observations.

## Task Hazard Analysis

**Task:** Removal Action Oversight, Field Logbook, and Photographic Documentation

<b>RISK LEVEL (High, Medium, Low)</b>	<b>HAZARD</b>	<b>RECOGNITION /SYMPTOMS</b>	<b>MITIGATION</b>	<b>LEVEL OF PROTECTION</b>
Medium	Potential Asbestos, Chemical Exposure	Being aware of the symptoms and risks of chemical exposure	Keep distance during sampling and removal activities, wear proper levels of PPE	Level C/B*
Medium	Heat Stress	Being aware of symptoms of heat stress, See FLD05	Take work breaks, hydrate with fluids	Level C/B*
Medium	Slips, trips, and falls due to Limited peripheral vision in Level B PPE	Take proper measures to avoid slips, trips, and falls due to limited visibility or debris on floor	Be aware of surrounds, avoid uneven and potentially dangerous surfaces	Level C/B*

\*Levels of Protection may be downgraded based on air monitoring readings and field observations.

# Frequency and Types of Air Monitoring:

☒ Continuous

☐ Routine - \_\_\_\_\_

☐ Periodic - \_\_\_\_\_

DIRECT READING INSTRUMENTS	MultiRAE CGI / O <sub>2</sub> / H <sub>2</sub> S / CL <sub>2</sub> / CO / PID	Ludlum 19 Micro-R Meter / Ludlum Model 3 Survey Meter	MicroFID or TVA-1000	Drager Chemical Detector Tube	Lumex Mercury Vapor Analyzer or Jerome 431X
EQUIPMENT ID NUMBER					
CALIBRATION DATE					
RST 2 PERSONNEL					
ACTION LEVEL	≥ 10 - 20% LEL (Confined Space / non- Confined Space)  ≤ 19.5% O <sub>2</sub> Deficient ≥ 23% O <sub>2</sub> - Enriched  H <sub>2</sub> S - PEL: 20 ppm IDLH: 100 ppm  Cl <sub>2</sub> - PEL: 1 ppm IDLH: 10 ppm	<3X Background Exercise Caution;  ≥ 1 mR/HR - Exit Area, Establish Perimeter, Contact RST 2 HSO	Unknowns:  1 - 5 Units - "Level C"  5-500 Units- "Level B"	PEL / TLV / IDLH: Compare with Drager Tube  (See Chart Below)	Mercury Vapors (Except Organo Alkyls):  PEL - 0.1 mg/m3 IDLH - 10 mg/m3

Dräger Tubes	Expiration Date	Strokes	Color Change
Nitrogen Dioxide - 2 to 100 PPM	See individual package before use	10 or 5	yellowish-green to bluish-grey
Phosgene - 0.25 to 5 PPM	See individual package	40 or 20	white to red
Hydrochloric Acid - 50 to 5,000 PPM	See individual package	1 or 10	blue to white
Cyanide - 2 to 15 mg/m <sup>3</sup>	See individual package	10	yellow to red
Acetic Acid - 5 to 80 PPM	See individual package	3	blue/violet to yellow
Chlorine - 0.2 to 3 PPM	See individual package	10	white to yellowish-orange
Ammonia - 5 to 70 PPM	See individual package	10	yellow to blue

### Emergency Telephone Numbers

Emergency Contact	Location / Address	Telephone Number	Notified
Hospital	The Memorial Hospital of Salem County 310 Salem Woodstown Road Salem, NJ - 08069	(856) 935-1000	Yes
Ambulance	Carneys Point Rescue Squad 258 D Street Carneys Point, NJ – 08069	(856) 299-2276 Or call 911	No
Police	Carneys Point Police Department 303 Harding Hwy Rt 48 Carneys Point, New Jersey 08069	(856) 299-0070 Or call 911	No
Fire Department	Carneys Point Fire Department 258 D Street Carneys Point, NJ – 08069	(856) 299-2276 Or call 911	Yes

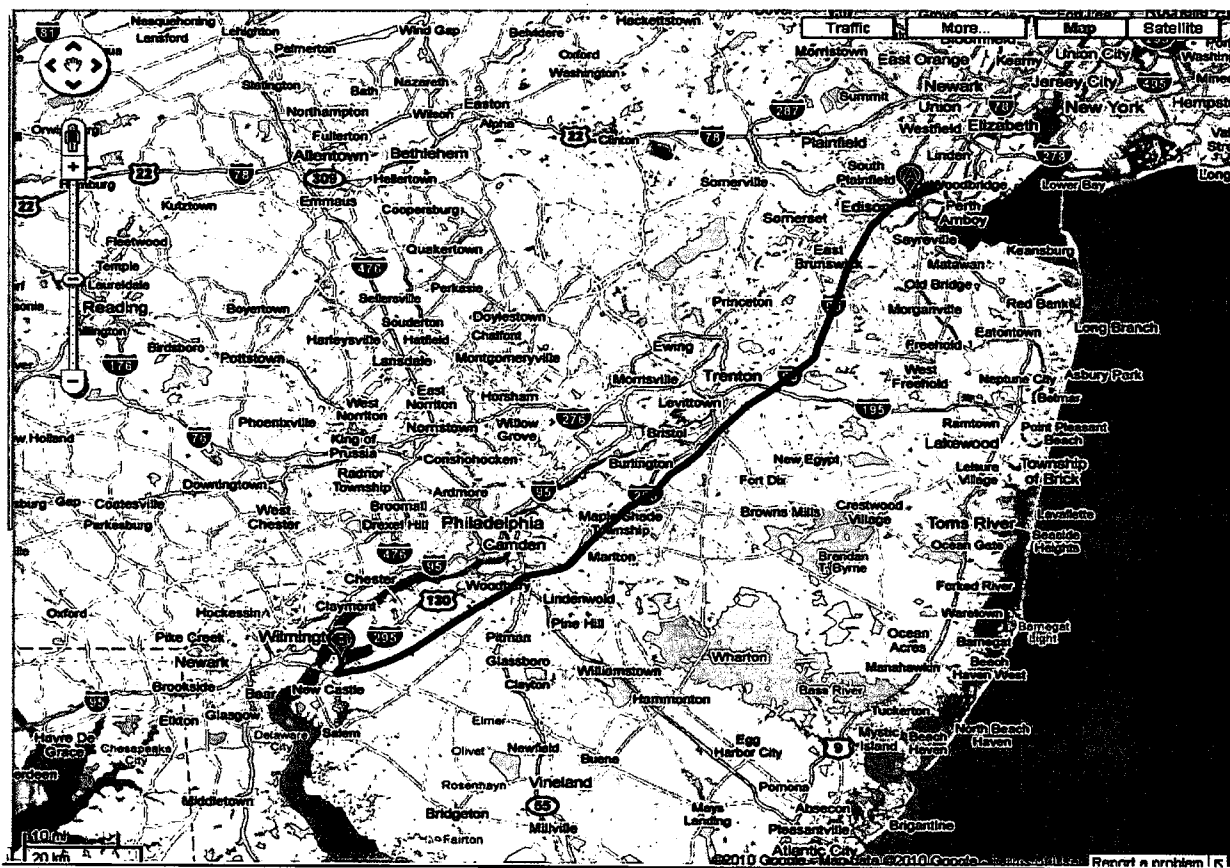
Chemical Trauma Capability? ☒ Yes ☐ No

If no, closest backup: \_\_\_\_\_ Phone: \_\_\_\_\_

#### Directions to The Memorial Hospital of Salem County; Salem, NJ:

1. Head southwest on County Road 551 S/S Pennsville Auburn Rd towards Soders Road – 0.7 mi
2. Take the third left onto NJ-140E – 0.3 mi
3. Continue onto Hawks Bridge Road/Rte 540 – 6.7 mi
4. Continue onto NJ-45 S/Salem Woodstown Road – 16 ft.  
Destination will be on the left.

**Total Estimated Time 17 minutes / Distance 7.7 Miles**



These maps are subject to Google's Terms of Service, and Google is the owner of rights therein.

Route verified by: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

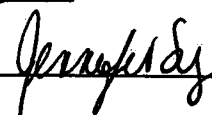
### Additional Emergency Telephone Contacts

<b>WESTON Medical Emergency Service</b> Dr. Peter Greaney, Medical Director WorkCare 300 South Harbor Blvd, Suite 600 Anaheim, California 92805	800-455-6155 Regular Business Hours (9AM to 7:30PM) Dial 0 or Ext. 175 for Michelle Bui to request the on-call clinician. 800-455-6155 After Hours (Weekdays 7:31PM to 8:59AM, Weekends, Holidays) Dial 3 to reach the after-hours answering service. Request that the service connect you with the on-call clinician or the on-call clinician will return your call within 30 minutes.
Chemtrec	800-424-9300
ATSDR	404-639-0615
ATF (explosives information)	800-424-9555
National Response Center	800-424-8802
National Poison Control Center	800-764-7661
<b>Chemtel</b>	800-255-3924
DOT	800-424-8802
CDC	800-232-0124

### Pre-Response Approval

HASP prepared by: Sean Hettinger

Date: 04/18<sup>SH</sup>/2011

Pre-Response/Entry Approval by: 

Date: 4/15/11

<b>Task Conducted</b>	<b>Level of Protection/Specific PPE Used</b>
Removal Action Oversight	Level C/B*
Site Documentation	Level C/B*

\*Levels of protection may be downgraded based on air monitoring readings and field observations

### **Hazardous Waste Site and Environmental Sampling Activities**

Off Site:    ☐ Yes    ☒ No

On Site:    ☐ Yes    ☒ No

Describe types of samples and methods used to obtain samples:

N/A

Was laboratory notified of potential hazard level of samples?    ☐ Yes    ☒ No

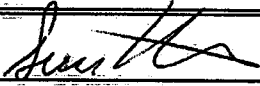
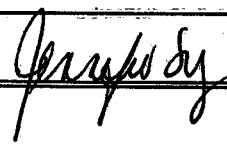
Note: The nature of the work assignment may require the use of the following procedures/programs which will be included as attachments to this HASP as applicable: Emergency Response Plan, Confined Space entry Procedures, Spill Containment Program.

Disclaimer: This Health and Safety Plan (HASP) was prepared for work to be conducted under the Removal Support Team 2 (RST2) Contract EP-W-06-072. Use of this HASP by WESTON and its subcontractors is intended to fulfill the OSHA requirements found in 29 CFR 1910.120. Items not specifically covered in this HASP are included by reference to 29 CFR 1910 and 1926.

The signatures below indicate that the individuals have read and understood this Health and Safety Plan.

PRINTED NAME	SIGNATURE	AFFILIATION	DATE

**Post-Response Approval**

Final Submission of HASP by:		Date 4/15/11
Post Response Approval by:		
RST 2 HSO Review by:		4/15/11

## Air Monitoring Summary Log

Date: \_\_/\_\_/

Data Collected by:

Station/Location	CGI / O <sub>2</sub> Meter / CL <sub>2</sub> / H <sub>2</sub> S	Radiation Meter	PID	FID / TVA-1000	Other ( )

**ATTACHMENT A:**  
**NIOSH POCKET GUIDES**



## Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

### Asbestos

**Synonyms & Trade Names** Actinolite, Actinolite asbestos, Amosite (cummingtonite-grunerite), Anthophyllite, Anthophyllite asbestos, Chrysotile, Crocidolite (Riebeckite), Tremolite, Tremolite asbestos

**CAS No.** 1332-21-4

**RTECS No.** CI6475000

**DOT ID & Guide** 2212 171  
☞ (blue, brown)  
2590 171 ☞ (white)

**Formula** Hydrated mineral  
silicates

**Conversion**

**IDLH Ca** [N.D.]  
See: IDLH INDEX

#### Exposure Limits

**NIOSH REL** : Ca See Appendix A See Appendix C  
**OSHA PEL** : [1910.1001] [1926.1101] See Appendix C

**Measurement Methods**  
**NIOSH** 7400 ☞ ,  
7402 ☞ ;  
**OSHA** ID160 ☞ ,  
ID191 ☞  
See: NMAM or  
OSHA Methods ☞

**Physical Description** White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.

**MW:** Varies

**BP:** Decomposes

**MLT:** 1112°F  
(Decomposes)

**sol:** Insoluble

**VP:** 0  
mmHg  
(approx)

**IP:** NA

**Sp.Gr:** ?

**FLP:** NA

**UEL:** NA

**LEL:** NA

**Noncombustible Solids**

**Incompatibilities & Reactivities** None reported

**Exposure Routes** inhalation, ingestion, skin and/or eye contact

**Symptoms** Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]

**Target Organs** respiratory system, eyes

Cancer Site [lung cancer]

**Personal Protection/Sanitation (See protection codes)**

**Skin:** Prevent skin contact

**Eyes:** Prevent eye contact

**Wash skin:** Daily

**Remove:** No recommendation

**Change:** Daily

**First Aid (See procedures)**

**Eye:** Irrigate immediately

**Breathing:** Fresh air

**Respirator Recommendations  
(See Appendix E)**

**NIOSH**

**At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

Click here for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

See also: INTRODUCTION

Page last reviewed: April 4, 2011

Page last updated: November 18, 2010

Content source: National Institute for Occupational Safety and Health (NIOSH) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA

30333, USA

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cdcinfo@cdc.gov





## Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

### Formaldehyde

**Synonyms & Trade Names** Methanal, Methyl aldehyde, Methylene oxide

**CAS No.** 50-00-0

**RTECS No.** LP8925000

**DOT ID & Guide**

**Formula** HCHO

**Conversion** 1 ppm = 1.23 mg/m<sup>3</sup>








**IDLH** Ca [20 ppm]  
**See:** 50000

#### Exposure Limits

**NIOSH REL :** Ca TWA 0.016 ppm C 0.1 ppm [15-minute] **See Appendix A**

**OSHA PEL :** [1910.1048] TWA 0.75 ppm ST 2 ppm

#### Measurement Methods

**NIOSH** 2016 , 2541 ,  
3500 , 3800   
**OSHA** ID205 , 52   
**See:** NMAM or OSHA  
**Methods** 

**Physical Description** Nearly colorless gas with a pungent, suffocating odor. [Note: Often used in an aqueous solution (see specific listing for Formalin).]

**MW:** 30.0

**BP:** -6°F

**FRZ:** -134°F

**Sol:** Miscible

**VP:** >1 atm

**IP:** 10.88 eV

**FLP:** NA  
(Gas)

**UEL:** 73%

**LEL:** 7.0%

**RGasD:** 1.04

#### Flammable Gas

**Incompatibilities & Reactivities** Strong oxidizers, alkalis & acids; phenols; urea [Note: Pure formaldehyde has a tendency to polymerize. Reacts with HCl to form bis-Chloromethyl ether.]

**Exposure Routes** inhalation, skin and/or eye contact

**Symptoms** irritation eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing; [potential occupational carcinogen]

**Target Organs** Eyes, respiratory system

**Cancer Site** [nasal cancer]

**Personal Protection/Sanitation** (See protection codes)  
**Skin:** No recommendation

**First Aid** (See procedures)  
**Eye:** Irrigate immediately

**Eyes:** Prevent eye contact  
**Wash skin:** No recommendation  
**Remove:** No recommendation  
**Change:** No recommendation

**Breathing:** Respiratory support

**Respirator Recommendations**  
**(See Appendix E)**

**NIOSH**

**At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

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(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

**Important additional information about respirator selection**

See also: INTRODUCTION See ICSC CARD: 0695 See MEDICAL TESTS: 0110

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**Exposure Routes** inhalation, skin and/or eye contact

**Symptoms** irritation eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing; [potential occupational carcinogen]

**Target Organs** Eyes, respiratory system

**Cancer Site** [nasal cancer]

**Personal Protection/Sanitation** (See protection codes)

**Skin:** No recommendation

**First Aid** (See procedures)

**Eye:** Irrigate immediately

**Eyes:** Prevent eye contact  
**Wash skin:** No recommendation  
**Remove:** No recommendation  
**Change:** No recommendation

**Breathing:** Respiratory support

**Respirator Recommendations**  
**(See Appendix E)**

**NIOSH**

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# International Chemical Safety Cards

**ZINC SULFATE**

ICSC: 1698



Zinc sulfate (anhydrous)  
Sulfuric acid, zinc salt (11)  
Zinc sulphate  
 $\text{ZnSO}_4$

Molecular mass: 161.4



ICSC # 1698

CAS # 7733-02-0

RTECS # ZH5260000

UN # 3077

EC # 030-006-00-9

November 23, 2007 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Seek medical attention if you feel unwell.
• <b>SKIN</b>	Redness.	Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness. Pain.	Safety spectacles	Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Do NOT let this chemical enter the environment.	Dry. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	Xn symbol N symbol R: 22-41-50/53 S: 2-22-26-39-46-60-61 UN Hazard Class: 9 UN Packing Group: III	

Signal: Warning  
 Excl mark-Enviro  
 Harmful if swallowed  
 Causes serious eye irritation  
 Very toxic to aquatic life

**SEE IMPORTANT INFORMATION ON BACK**


**ICSC: 1698**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**ZINC SULFATE**

**ICSC: 1698**

<p><b>I M P O R T A N T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS HYGROSCOPIC CRYSTALS .</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The solution in water is a weak acid.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK: (Respirable fraction) : 0.1 mg/m<sup>3</sup>; Peak limitation category: I(4); (Inhalable fraction) : 2 mg/m<sup>3</sup> Peak limitation category: I(2); Pregnancy risk group: C (DFG 2009).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion .</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is severely irritating to the eyes and is irritating to the gastrointestinal tract and the respiratory tract.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Melting point (decomposes): 680°C Density: 3.8 g/cm<sup>3</sup></p>	<p>Solubility in water, g/100 ml at 20°C: 22 (good) Octanol/water partition coefficient as log Pow: -0.07</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.</p>	
<p><b>NOTES</b></p>		
<p>Transport Emergency Card: TEC (R)-90GM7-III        Card has been partially updated in April 2010: see Occupational Exposure Limits,</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		

**ICSC: 1698**

**ZINC SULFATE**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

## **GENERAL**

Heat stress may occur at any time work is performed at elevated temperatures. Wearing chemical protective clothing often decreases natural body heat loss and increases the risk of heat stress.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, with symptoms ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration or dexterity) to fatal. Because heat stress is one of the most common and potentially serious illnesses at hazardous waste sites, regular monitoring and other preventive measures are vital to ensure worker safety.

Employees who are taking prescription or over-the-counter medications should consult with their personal physician prior to working in high-temperature environments.

## **REFERENCES**

OSHA 29 CFR 1910 and 1926

Related FLD OPS:

*FLD02 – Inclement Weather*

*FLD03 – Hot Processes – Steam*

*FLD08 – Confined Space Entry*

*FLD36 – Welding, Cutting and Burning*

*FLD37 – Pressure Washing*

## **APPENDICES**

A Common Heat Stress Disorders and Their Prevention and Treatment

## **PROCEDURE**

### **Recognition and Risk Assessment**

In the planning stages of a project, the potential for heat stress disorders must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely heat stress disorders that may occur.

Revised 11/1999

The SHSC must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great. In addition, all site personnel must be aware of these symptoms in both themselves and their co-workers.

Four common heat stress disorders and their associated prevention and treatment methods are provided in Appendix A.

### **Prevention and Protection Programs**

Heat stress is affected by several interacting factors including, but not limited to, age, obesity, physical condition, substance abuse, level of personal protective equipment worn, and environmental conditions (temperature, shade, and humidity). Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventive heat stress management such as the examples given below.

Have workers drink 16 ounces of water before beginning work, at established breaks, and in the morning or after lunch. The body's normal thirst mechanism is not sensitive enough to ensure body fluid replacement, therefore, pre- and post-work fluid intake is necessary. Under heavy work and heat conditions, the body may lose up to 2 gallons of fluids per day. In order to prevent heat stress symptoms, the individual must ensure replacement of this moisture.

Provide disposable cups that hold about 4 ounces, and water that is maintained at 50 to 60°F. Have workers drink 16 ounces of water before beginning work, and a cup or two at each break period. Provide a shaded area for rest breaks. Discourage the intake of caffeinated drinks during working hours. Monitor for signs of heat stress.

Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body's electrolyte balance. Bananas are especially good for maintaining the body's potassium level. The most important measure to prevent heat-related illness is adequate fluid intake. Workers should drink 1/2 to 1 quarts of liquids per hour in high heat conditions. Most of this liquid should be water.

If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes.

Acclimate workers to site work conditions by slowly increasing workloads, i.e., do not begin work activities with extremely demanding tasks. Rotate shifts of workers who are required to wear impervious clothing in hot weather. In extremely hot weather, conduct field activities in the early morning and evening.

Revised 11/1999

Provide cooling devices to aid natural body heat regulation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear, which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.

Ensure that adequate shelter is available to protect personnel against heat and direct sunlight, which can decrease physical efficiency and increase the probability of heat stress. If possible, set up the command post in the shade.

Good hygienic standards must be maintained by frequent showering and changes of clothing. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

### **Heat Stress Monitoring and Work Cycle Management**

When strenuous field activities are part of on-going site work conducted in hot weather, the following guidelines should be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70°F and the tasks/risk analysis indicates an increased risk of heat stress problems. Consult the HASP and a safety professional (e.g., Division safety manager, safety officer) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

Measure Heart Rate – Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the rest period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats per minute.

Measure Body Temperature – When ambient temperatures are over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the rest period. If the oral temperature exceeds 99.6°F (or 1 degree change from baseline) at the beginning of the rest period, the following work cycle should be shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F (or 1 degree change from baseline). Under no circumstances should a worker be allowed to work if their oral temperature exceeds 100.6°F.

Measure Body Water Loss – Body water loss greater than 1.5% of total body weight is indicative of a heat stress condition. Body weight is measured before personal protective equipment (PPE) is donned and after the PPE is removed following a work cycle. Body water loss can be measured with an ordinary bathroom scale, however, the scale must be sensitive to one-half pounds increments. A worker is required to drink additional fluids and rest if their body water loss is greater than 1.5%.

Revised 11/1999

Note: For purposes of this operating practice, a break is defined as a 15-minute period and/or until an individual's vital signs are within prescribed guidelines.

A physiological monitoring schedule is determined by following the steps below:

Measure the air temperature with a standard thermometer.

Estimate the fraction of sunshine by judging what percent the sun is out (refer to Table 1).

Calculate the adjusted temperature based on the following formula:

Adjusted Temperature = Actual Temperature + 13 X  
(fraction of the percent sunshine factor)

Using Table 2, determine the physiological monitoring schedule for fit and acclimated workers.

The length of work period is governed by frequency of physiological monitoring (Table 2). The length of the rest period is governed by physiological parameters (heart rate and oral temperature). For example, site personnel anticipate wearing level C (impermeable clothing) during site activities.

The air temperature is 80°F and there are no clouds in the sky (100% sunshine). The adjusted temperature is calculated in the following manner:

Adjusted Temperature (Adj T °F) = Actual Temperature (Amb T °F) + (13 x fraction of the percent sunshine factor).

Adj T °F = 80°F + (13 x 1.0)

Adj T °F = 93°F

Using Table 2, the pulse rate, oral temperature and body water loss monitoring would be conducted after each 60 minutes of work. The adjusted temperature may need to be redetermined if the percent sunshine and ambient temperature changes drastically during site work.

If an individual's heart rate exceeds 110 beats per minute at the beginning of the rest period, that individual will continue to rest until his or her heart rate drops to baseline; the next work period is then decreased by 33%.

Revised 11/1999

TABLE 1

**PERCENT SUNSHINE FACTORS  
HEAT STRESS PREVENTION AND MONITORING**

Percent Sunshine (%)	Cloud Cover	Sunshine fraction
100	No cloud cover	1.0
50	50% cloud cover	0.5
0	Full cloud cover	0.0

**TABLE 2**

**PHYSIOLOGICAL MONITORING SCHEDULE  
HEAT STRESS PREVENTION AND MONITORING**

Adjusted Temperature	Level D (Permeable clothing)	Level C, B, or A (Nonpermeable clothing)
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F (30.8°C)-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°F (28.1°C)-32.2°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°F (25.3°C)-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°F (22.5°C)-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Revised 11/1999

## APPENDIX A

### COMMON HEAT STRESS DISORDERS AND THEIR PREVENTION AND TREATMENT

#### Heat Rash

Heat rash is caused by continuous exposure to heat and humidity, and is aggravated by chafing clothes. The condition decreases an individual's ability to tolerate heat and can be extremely uncomfortable.

Symptoms – Mild red rash, especially in areas of the body that come into contact with protective gear.

Treatment – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing.

#### Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water, however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into the active muscle tissue, causing cramping.

Symptoms – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.

Treatment – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of lightly salted water or diluted commercial electrolyte solution immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery (e.g., Gatorade, Quench) however, it is best to double the amount of water required by the dry mix package directions or add water to the liquid form.

#### Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.

Symptoms – Pale, clammy, and moist skin, profuse perspiration, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, and may feel dizzy.

Treatment – Move the victim to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the victim to rest. Consult a physician, especially in severe cases. Have the victim drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside.

Revised 11/1999

## **Heat Stroke**

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat regulating mechanisms, i.e., the individual's temperature control system (sweating) stops working correctly. Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

Symptoms – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature, rapid respiratory and pulse rate, unconsciousness or coma.

Treatment – Remove the victim from the source of heat and cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Soak the victim in cool (not cold) water, sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (less than 102°F). Monitor the victim's vital signs and obtain immediate medical help. Do not give the victim coffee, tea, or alcoholic beverages.

Revised 11/1999

## **FLD 11 ROUGH TERRAIN/ATV USE**

### **RELATED FLDs**

*FLD 02 – Inclement Weather*

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*FLD 22 – Heavy Equipment Operation*

*FLD 47 – Clearing, Grubbing, and Logging Operations*

*FLD 57 – Motor Vehicle Safety*

### **HAZARD**

Physical hazards associated with rough terrain include vehicle accidents, heavy equipment incidents, falling, slipping, and tripping.

Driving vehicles on uneven surfaces creates a possibility of the vehicle rolling, getting stuck in mud or ditches, or of an accident due to flat tires or striking obstacles and other vehicles.

When working on foot, step inclines and heavy or downed vegetation can hide holes or breaks in the terrain, increasing the risk of slips, trips, and falls.

### **RECOGNITION AND RISK ASSESSMENT**

Rough terrain complicates work activities and adds to or increases risk. In the planning stages of a project, rough terrain must be considered as a physical hazard and identified in the site-specific health and safety plan (HASP). Risk assessment is usually accomplished from site history information (i.e., site topography) and on site by the Field Safety Officer (FSO).

### **HAZARD PREVENTION AND PROTECTION PROGRAMS**

#### **Safety on Foot**

Personnel working on rough terrain should maintain a high level of physical conditioning due to increased body stress and exertion.

The site crew should be alert and observe terrain while walking to minimize slips, trips, and falls.

Boots should be ankle high or higher to provide additional support and stability.

Work will be completed in adequate natural light or sufficient illumination will be maintained.

Site personnel will conduct an initial walkover and the “buddy system” will be implemented.

Emergency communications such as a cell phone or two-way radio should be carried at all times.

Personnel should be aware of potential hazards and ensure the availability of first-aid supplies and knowledge of the location of the nearest medical assistance.

### **VEHICLE SAFETY**

Vehicle drivers and passengers will wear seatbelts at all times.

Hazards can be prevented by ensuring regular maintenance is performed on vehicles and all safety features are working. Have brakes and wheel bearings of vehicles used off road or in four wheel drive inspected at increased frequency (suggest inspections at twice the manufacturer's recommended frequency).

In order to minimize accidents, site surveillance on foot may be required to ensure clear driving paths.

Minimize side hill travel. Travel straight up and down hills whenever possible. Passengers will not be allowed when side hill travel is required.

Take into account loads or superstructure of vehicles which raise the center of gravity and increase risk of tipping.

Cross streams, small logs or other passable (there is adequate clearance of the undercarriage) obstructions at right angles.

Four wheel drive vehicles should be used if terrain conditions are wet, frozen, broken, or otherwise deemed unsafe for two wheel drive vehicles by the FSO. Use of vehicles off-road will be specifically addressed in the HASP and personnel operating vehicles will be checked for proficiency.

- Before moving a vehicle in the field, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a vehicle before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Engage the all wheel drive when traveling off highway on hilly terrain.
- Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the vehicle/equipment has been moved to a new site, set all brakes and/or locks. When grades are steep, block the wheels.

#### **Definitions**

**Class I, All-terrain vehicle (ATV):** A motorized off-highway vehicle, 50 in. (127 cm) or less in width, having dry weight of 800 lbs (362.9 kg) or less, and traveling on three or more low pressure tires (10 lbs [4.5 kg] psi or less), with a seat designed to be straddled by the operator.

**Class I, Category G, ATV:** An ATV intended for general recreational and utility use.

**Class I, Category U, ATV:** An ATV intended primarily for utility use.

**Class II, ATV:** A motorized off-highway vehicle with a width which exceeds 50 in. (127 cm) or having a dry weight that exceeds 800 lbs (362.9 kg), traveling on four or more low-profile, low-pressure tires (10 lbs [4.5 kg] psi or less) and having a bench seat.

**NOTE:** Utility Vehicles are designed to perform off-road utility tasks such as passenger and cargo transportation and are addressed separately below. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Rollover Protective Structure (ROPS). A cab or frame that provides a safe environment for the tractor operator in the event of a rollover.

## **ALL TERRAIN VEHICLES (ATVS)**

### **Qualifications**

ATV operators will have completed a nationally recognized accredited ATV training course (such as provided by the Specialty Vehicles Institute of America or in-house resources that have been certified as trainers by an accredited organization) prior to operation of the vehicle.

The operator must pass an operating skills test prior to being allowed to operate an ATV. Proof of completion of this training will be maintained.

### **Equipment**

All ATVs shall be equipped with:

- An operable audible warning device (horn);
- Headlights (if it will be used during hours of darkness);
- Taillights; and
- Brake lights.
- Mufflers and spark arresters.

All Class II ATVs will be equipped with ROPS and seatbelts

### **Operation**

Only Class I and Class II ATVs with four or more wheels may be used. Class III ATV's may not be used.

The manufacturer's recommended payload will not be exceeded at any time.

Gloves and an approved motorcycle helmet with full-face shield or goggles will be worn at all times while operating a Class I ATV.

An ATV will not be driven on public roadways except to cross the roadway, and it will only be driven on a public roadway at designated crossing points or with a road guard (no paved road use unless allowed by the manufacturer).

A copy of the operator's manual will be kept on the vehicle and protected from the elements (if practicable).

Tires shall be inflated to the pressures recommended by the manufacturer.

Passengers are prohibited on Class I ATVs.

## UTILITY VEHICLES

Utility vehicles are defined as specialty Class II ATVs designed to perform off-road utility tasks such as passenger and cargo transportation. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Utility vehicle operators shall be trained and familiar with the use of all controls; understand proper moving, stopping, turning and other operating characteristics of the vehicle. Operators must review all training materials provided by the manufacturer for the specific vehicles, and training should be in accordance with appropriate manufacturer recommendations. A copy of the operator's manual shall be kept on the vehicle at all times and protected from the elements. At a minimum, training should address:

- Basic riding tips from the manufacturer's published literature for each vehicle.
- Reading terrain.
- Climbing hilly terrain.
- Descending a hill.
- Traversing a slope.
- Riding through water.
- Cargo carriers and accessories.
- Loading and unloading.
- Troubleshooting.
- Proper preventative maintenance, (i.e., oil levels, tire pressure requirements and scheduled maintenance requirements according to the manufacturer's guidelines.).

Utility vehicles shall be equipped with:

- Operable audible warning device (horn).
- Headlights.
- Taillights.
- Brake lights.
- Seatbelts.
- ROPS.

Occupancy in utility vehicles is limited to manufacturer designated seating that has built-in seatbelts. Passengers may not ride in the vehicle's back cargo area unless the vehicle is otherwise equipped. Note: When used for emergency response, medical litters may be placed in the back cargo area but must be secured as described below.

The manufacturer's recommended load carrying capacity, personnel capacity, or maximum safe vehicle speed shall not be exceeded at any time.

Cargo items will be secured as necessary to prevent movement/tipping. All loads over fifty pounds (to include medical litters) must be securely strapped to cargo tie-downs in the rear and to the cargo shelf in the front.

Seatbelts will be worn by operators and passengers of specialty vehicles where installed by the manufacturer. Operators and passengers shall wear goggles at all times when a utility vehicle, not equipped with a windshield, is in motion.

Utility vehicles will not normally be driven on public roadways except to cross the roadway, and will only be driven on a public roadway at designated crossing points or with a road guard. Utility vehicles that are allowed to operate outside a controlled work area and/or on public roads will meet the minimum vehicle safety standards in accordance with 49 CFR 571.5, to include ROPs, seatbelts and placement of "Slow Moving Vehicle" emblems where required.

Manufacturer-installed safety equipment will be maintained in working order and used in compliance with the requirement of this regulation and in accordance with manufacturer's recommendations.

## **RULES**

Observe the following practices to help prevent accidents:

- Do not misuse utility vehicles.
- Reduce speed and exercise extreme caution on slopes or on rough ground.
- Do not overload vehicle and avoid shifting loads. Reduce load when operating over rough or hilly terrain.
- Do not stop or start suddenly when going uphill or downhill. Be especially cautious when changing direction on slopes.
- Stay alert for holes, rocks, and other hidden hazards in the terrain.
- Keep away from drop-offs, ditches, embankments, as well as ponds and other bodies of water. The machine could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- Keep front wheels straight at crest of hill or going over bumps.
- When descending a hill, remove foot from accelerator and apply brakes to reduce speed and maintain control.

## **Transport Loads Safely**

- Be sure load is evenly distributed.
- Do not load above the load guard.
- Securely anchor all loads in cargo box.
- Reduce cargo box capacity when operating on rough or hilly terrain.
- Use existing trails. Avoid terrain such as dangerous slopes and impassable swamps. Watch carefully for sharp bumps, holes, ruts, or obstacles.
- Look ahead at terrain. Know what is coming and be prepared to react. Be alert for hazards.
- Keep front wheels straight at the crest of a hill or going over bumps.
- Reduce speed according to trail, terrain, and visibility conditions.
- The passenger should always use the hand holds.

### **Climbing or Descending a Hill**

- Always use the brakes when going down slopes, the utility vehicle can speed up (freewheel) going down a slope. Engine or clutch braking effect is minimal.
- Balance loads evenly and secure them. Braking could shift the load and affect vehicle stability.
- Sit on the center of the seat and keep both feet within the foot platform.
- Never drive past the limit of visibility. Slow down near the crest of a hill until getting a clear view of the other side.
- If the vehicle stops or loses power going up a hill, lock the park brake to hold the vehicle on slope. Maintain direction of travel and release the brake slowly. Back straight down hill slowly while maintaining control. Do not turn the vehicle sideways. The vehicle is more stable in a straight forward or rearward position.
- If the utility vehicle begins to tip, turn the front wheel downhill to gain control before proceeding.

### **Riding Through Water**

- Avoid water whenever possible. If the drive belt becomes wet, slippage will occur and the vehicle will lose power.
- Never cross any body of water where the depth may be unknown to the operator. As an operational guideline, deep water is considered anything in excess of 152 mm (6 in.) in depth. Tires may float, making it difficult to maintain control.
- Choose a course within the waterway where both banks have a gradual incline. Cross at a point known to be safe.
- Proceed at a slow steady speed to avoid submerged obstacles and slippery rocks.
- Avoid water crossings where the operation of a utility vehicle may cause damage to waterway beds or erode waterway shoreline.

## **FLD 22 EARTH MOVING EQUIPMENT/MATERIAL HANDLING EQUIPMENT**

### **REFERENCES**

*29 CFR Part 1926 Subparts 600-602*

### **RELATED FLDs**

*FLD 23 – Cranes, Rigging, and Slings*

*FLD 24 – Aerial Lifts/Manlifts*

*FLD 34 – Utilities*

*FLD 35 – Electrical Safety*

### **PROCEDURE**

These rules apply to the following types of earthmoving equipment: scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment.

#### **Machinery and Mechanized Equipment Safety**

Before any machinery or mechanized equipment is placed in use, it will be inspected and tested by a competent mechanic and certified to be in safe operating condition.

WESTON will designate a competent person to be responsible for the inspection of all machinery and equipment daily and during use to make sure it is in safe operating condition. Tests will be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.

Preventative maintenance procedures recommended by the manufacturer will be followed.

Any machinery or equipment found to be unsafe shall be removed from service and its use prohibited until unsafe conditions have been repaired or corrected.

Inspections or determinations of road conditions and structures will be made in advance to ensure that clearances and load capacities are safe for the passing or placement of any machinery or equipment.

Machinery and mechanized equipment will be operated only by designated personnel. Equipment deficiencies observed at any time that affect safe operation will be corrected before continuing operation.

Seat belts shall be provided on all equipment covered by this section and shall meet the requirements of the Society of Automotive Engineers (J386-1969) and Seat Belts for Construction Equipment. Seat belts for agricultural and light industrial tractors shall meet the seat belt requirements of Society of Automotive Engineers (J333a-1970), Operator Protection for Agricultural and Light Industrial Tractors.

Seat belts shall be worn when provided by the manufacturer. Passengers shall not be allowed to ride on equipment unless equipment is designed with additional seats with safety belts.

**Audible alarms.** All bi-directional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in an operative condition.

Getting off or on any equipment while it is in motion is prohibited.

Machinery or equipment requiring an operator will not be permitted to run unattended.

Machinery or equipment will not be operated in a manner that will endanger persons or property, nor will the safe operating speeds or loads be exceeded.

All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. The only exemption is equipment designed to be serviced or maintained while running.

All repairs on machinery or equipment will be made at a location that will provide protection from traffic or other hazards to maintenance personnel.

Machinery and equipment, or parts thereof, that are suspended or held apart by slings, hoists, or jacks also will be substantially blocked or cribbed before personnel are permitted to work underneath or between them.

Bulldozer and scraper blades, front end-loader buckets, dump bodies, and similar equipment will be either fully lowered or blocked when being repaired or when not in use. All controls will be in a neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

Stationary machinery and equipment will be placed on a firm foundation and secured before being operated.

All points requiring lubrication during operation will have fittings so located or guarded to be accessible without hazardous exposure.

When necessary, all mobile equipment and the operating area will be adequately illuminated while work is in progress.

Mechanized equipment will be shut down prior to and during fueling operations. Closed systems, with automatic shutoff that will prevent spillage if connections are broken, may be used to fuel diesel powered equipment left running.

All towing devices used on any combinations of equipment will be securely mounted and structurally adequate for the weight drawn.

Persons will not be permitted to get between a piece of towing equipment and the item being towed until the towing equipment has come to a complete stop.

All equipment with windshields will be equipped with powered wipers. Vehicles that operate under conditions that cause fogging or frosting of windshields will be equipped with operable defogging or defrosting devices.

All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, will have lights or reflectors, or barricades equipped with lights or reflectors, to identify the location of the equipment.

Whenever the equipment is parked, the parking brake will be set. Equipment parked on inclines will have the wheels chocked or track mechanism blocked and the parking brake set. Equipment such as lift trucks and stackers will have the rated capacity posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also will be clearly shown on the vehicle. The ratings will not be exceeded.

Steering or spinner knobs will not be attached to the steering wheel unless the steering mechanism prevents road reactions from causing the steering hand wheel to spin. When permitted, the steering knob will be mounted within the periphery of the wheel.

All industrial trucks in use will meet the requirements of design, construction, stability, inspection, testing, maintenance, and operation, defined in American National Standards Institute (ANSI) B56.1, Safety Standards for Powered Industrial Trucks.

The installation of live booms on material and personnel hoists is prohibited.

The controls of loaders, excavators, or similar equipment with folding booms or lift arms will not be operated from a ground position unless so designed.

Personnel will not work or pass under the buckets or booms of loaders in operation.

Cranes and any other equipment used for lifting must be inspected as required and records of inspection must be maintained.

#### **Drill Rigs**

See FLD 56, *Drilling Safety*

## **FLD 26 LADDERS**

### **REFERENCES**

ANSI A-14.1, A-14.2, A-14.3  
29 CFR 1910.25, 1910.16, 1910.27

### **RELATED FLDs**

*FLD 25 – Working at Elevation/Fall Protection*

#### **Portable Ladders**

Portable ladders must be used for their designed purpose only. Portable ladders must be used, maintained, and constructed according to American National Standards Institute (ANSI) Standards A-14.1 and A-14.2, Occupational Safety and Health Administration (OSHA) 29 CFR 1910.25 and .26 and manufacturer's instructions.

#### Inspection

Portable ladders must be examined for defects prior to use. Examination shall include, but not be limited to, ensuring that:

1. Joints between steps or rungs are tight.
2. Hardware and fittings are secure, and rivets are not sheared.
3. Metal bearings (e.g., locks, wheels, pulleys) are lubricated.
4. Rope on extension ladders is in good condition.
5. Rungs are not loose, cracked, bent, or dented; are free of splinters or splinters; and are treated to prevent slipping.
6. Side rails are not cracked, bent, or dented and are free of splinters.

**Note: defective ladders must not be used.** Ladders found to be defective should be clearly tagged to indicate NO USE, if repairable, or destroyed immediately if repair is not possible.

#### Use Requirements

Ladders must be set on a flat, firm surface with both handrails in contact with an upper support which is sufficiently strong and rigid.

Straight ladders must have secure footing provided by a combination of safety feet, top of ladder tie-offs and mud sills, or a person holding the ladder to prevent slipping.

When middle or top sections of sectional ladders are used as bottom sections, they must have safety feet.

The ratio of the distance to the foot of a ladder from the base of the vertical plane to the height from the base to the top of the vertical plane when the ladder rests on the top of the vertical plane shall be no more than 1:4 and no less than 1:3 (e.g., 1 foot out from a wall for every 4 feet up the wall to the point where the ladder rests against the wall).

The handrails of a straight ladder must extend at least 36 inches above the landing.

Straight ladders may not be lashed together to make sectional ladders.

Metal ladders must not be used near electrical conductors.

Workers must use both hands, and must face the ladder when ascending and descending.

No more than one person may use a straight portable ladder at a time.

Standing on the top rung/step or above the manufacturer's safe indication is prohibited.

Ladders should be positioned so workers do not have to lean more than half of their body beyond (outside of) either handrail.

Ladders must not be placed in front of doors that open toward the ladder unless the door is locked and the person(s) using the ladder has the key, the door is blocked open and other persons are warned of the presence of the ladder, or a guard is posted at the door.

Ladders must be inspected after each use and if acceptable, stored in a manner not to damage or stress the ladder. Ideally, ladders should be hung from a side rail in an area where sunlight or extremes in temperature or humidity will not affect them.

Ladders must never be used as scaffolding, storage racks, or shelves. Requirements for construction of portable ladders include:

- Ladders must conform to construction criteria of ANSI Standards A-14.1 and A-14.2.
- Ladders must have at least 12 inches between side rails and should have 12 inches between rungs.
- Ladder length must not exceed 30 feet for single section ladders, 48 feet for two-section ladders, and 60 feet for ladders with more than two sections. The minimum overlap for extension ladders must be 36 inches for up to 36 feet, 48 inches for 36 to 48 feet, and 60 inches for up to 60 feet. There must be positive stops to ensure proper overlap.
- Metal ladders must be of sufficient strength and corrosion resistant.
- Steps or rungs of metal ladders must be treated to prevent slipping.

#### **Fixed Ladders**

Fixed ladders shall be constructed and used in accordance with OSHA Standards, 29 CFR 1910.27, and ANSI Standard A-14.3.

#### **Requirements for Construction**

**Loading Requirements:** A minimum live load capacity of 200 lb. is concentrated at the points of maximum stress. Capacity must be increased in 200-lb increments for each additional person, based on the rate of use and potential for more than one person using a ladder or ladder section at the same time.

Weight of the ladder itself and appurtenances must be considered in designing the railings and fastenings.

Wooden ladders must meet design stress requirements of 29 CFR 1910.25.

**Feature Requirements:** Metal rungs must be a minimum of 3/4-inch in diameter, except where corrosive atmospheres exist. In corrosive atmospheres, metal rungs must be 1-inch minimum diameter or coated to

prevent corrosion. Wooden rungs must be a minimum of 1 inch in diameter. The distance between rungs, cleats, or steps must be no more than 12 inches. Rungs, cleats, or steps must be uniformly spaced throughout the length of the ladder.

The minimum clear width of rungs, cleats, or steps is 16 inches.

Rungs, cleats or steps, and side rails that may be used for handholds when climbing, must offer adequate gripping surface and be free of splinters, splinters or burrs, and substances that could cause slipping.

Ladders constructed of different metals, which could result in electrolytic action, must incorporate electrolytic protection. Ladders in atmospheres that could affect the integrity of the ladder must be treated to prevent corrosion or deterioration.

Fixed ladders (unless of sufficient height to use caging or a well construction as fall protection) must have as a minimum:

- 15 inches of clearance from the centerline of the rungs to each side.
- 30 to 36 inches from the rungs to any obstruction on the climbing side of the ladder.
- 7 inches between the rungs and any obstruction on the non-climbing side of the ladder.
- grab rails or extensions of side rails reaching a minimum of 40 inches above the landing.
- be oriented so that it is not necessary to step across more than 12 inches to a point of landing through or to the side of the ladder.

Ladders of greater than 20 feet must have cages or other approved fall protection devices. Where cages or wells are used for fall protection, the cage must begin no lower than 7 feet from the "ground" landing, but no higher than 8 feet. Ladders of more than 30 feet must have sections offset with side-accessed landings (minimum dimensions 24 inches wide by 30 inches long) located at least 4 feet below the top of a 30-foot section (or fraction thereof). The distance from the rungs to the cage back on the climbing side must be between 27 and 28 inches, and the width of the cage or well no less than 27 inches. There should be no projections through the cage. Projections in wells may reduce space from rung to projection to no less than 24 inches, and projections must have deflectors for head protection.

Where fall protection is provided by ladder safety systems (body belts or harnesses, lanyards, and braking devices with safety lines or rails), systems must meet the requirements of and be used in accordance with FLD 25 and be compatible with construction of the ladder system.

## **FLD 34 UNDERGROUND UTILITIES**

### **REFERENCES**

29 CFR 1926.651, *Specific Excavation Requirements*  
ANSI Standard Z 535.1, *American National Standard for Safety Color Code*

### **RELATED FLDs**

*FLD 42 – Lockout/Tagout*

This Field Operation Procedure (FLD) provides requirements for identification, location, and avoidance of underground utilities, appurtenances, and structures during intrusive activities. These requirements are applicable to all Weston Solutions, Inc. (WESTON) operations. The procedures address the requirements and recommendations for identifying and locating, working around, and encountering or contacting underground utilities. The FLD also addresses actions to be taken in response to encountering or contacting underground utilities.

### **DEFINITIONS**

#### **Aggressive Methods**

The use of mechanized equipment such as (but not limited to) excavators, backhoes, drill rigs, directional drilling, Geoprobe operations (including all direct push techniques), or road saws.

#### **Buffer Zone**

As defined in this procedure, the area around a utility where only non-aggressive excavation methods may be utilized, unless specific conditions are met.

The definition cited above, and the excavation requirements and restrictions associated with it, will vary depending on the particular state regulations. WESTON requires the imposition of a **three-foot Buffer Zone** on all sides of the utility as measured from the outside edges of the utility, both horizontally and vertically. State and/or local buffer zone requirements must be verified by consulting the applicable state regulations in the event buffer zones greater than three feet are required.

The term “Buffer Zone” may be referred to as the “Tolerance Zone”, “Safety Zone”, or “Approximate Location of Underground Utilities” in some jurisdictions.

#### **Competent Person**

A Competent Person has the ability to recognize hazards associated with underground utilities and the authority to stop or direct operations to ensure the safety of personnel and conformance with this procedure. The Competent Person has an understanding of this procedure, and the “One-Call” system requirements for the jurisdiction where excavation is occurring. The Competent Person must be capable of notifying One-Call agencies and maintaining and tracking One-Call Locate Numbers. Additionally, they must have knowledge of methods and work practices for excavation work and the identification, avoidance, and protection of underground utilities.

The designation of a Competent Person will be made by the Site Manager (SM) or Project Manager (PM) and documented in the site-specific Health and Safety Plan (HASP) or attachment to the HASP. Each WESTON Competent Person is required to successfully complete WESTON’s internal training program on the use and application of this FLD and possess appropriate and relevant field experience.

The names of Subcontractor Competent Persons will be documented in the Site-Specific *Subcontractor Acknowledgment: Supervisor Personnel, Competence of Personnel, and Task Understanding* form. Subcontractor Competent Persons will be expected to follow this FLD or their company's procedures, whichever is more restrictive.

### **Damage**

Damage may be considered as any undesired impact or unanticipated removal of support from an underground utility as a result of excavation or demolition. Damage may be as simple as minor contact (by any means) resulting in displacement of protective coating. The utility owner must be contacted regarding any damage or question of damage.

### **De-Energize**

As applicable to a utility, to physically eliminate and/or prevent the presence, transmission, flow, or release of energy or materials which may cause harm to personnel or property.

### **Excavation (Intrusive Activity)**

An operation using mechanized equipment for the purpose of movement or removal of earth, rock, or the materials in the ground, including but not limited to: digging, blasting, augering, test boring, drilling, pile driving, directional drilling, grading, plowing-in, hammering (including hammer-drill soil gas sampling tube installation), pulling-in, jacking-in, trenching, tunneling, structural demolition, milling, scraping, tree and root removal (grubbing), and fence or sign post installation. Note that in some States or jurisdictions, excavation may include hand augering or use of other hand tools.

### **Jurisdiction**

The Authority having legal jurisdiction for establishing and/or enforcing regulations and requirements for notification of excavation activities and associated identification and marking of underground utilities. In the United States, the States have jurisdiction, and most consider the regulations applicable when excavation is to be performed in any location, including any public or private way, any company right-of-way or easement, or any public or privately owned land or way. Note: One caveat to remember – Jurisdiction may flow to the “owner” on private or government-owned property because the State One-Call Agencies may not clear utilities on such facilities.

Note that easement boundaries may require differing methods for compliance assurance. Railroads and certain above ground utilities have easements that require specific procedures for excavation (including shoring and shielding of both the utility as well as for the track and/or poles). In these cases it may be required that an inspector or representative of the railroad or utility is present at all phases of the activity.

### **Locate**

To indicate the existence of a utility by establishing a mark through the use of flags, pins, stakes, paint, or some other customary manner, that *approximately* determines the location of a line or facility.

### **Locate Request**

A communication between an entity performing intrusive activities and a utility marking agency (One-Call, etc).

### **Non-Aggressive Methods**

Non-Aggressive methods involve the use of manual methods such as hand digging with shovels or by potholing or daylighting methods.

#### **Observer**

The person assigned to visually monitor and, as needed, signal the operator during mechanized intrusive activity when the activity is occurring within three feet of the outside edge of the buffer zone. The observer remains in close communication with the equipment operator(s) and will stop the activity if needed.

#### **One-Call Agency**

An entity that administers a system through which a person can notify owners/operators of underground lines or utilities of the intent to perform intrusive activities in proposed public areas. **It is important to note that not all underground utility owners may be required to join the One-Call system. Additionally, some underground utility owners may not comply with State registration requirements.** The SM or Competent Person is responsible to determine additional utilities that may need to be contacted individually.

#### **Positive Response**

Verification prior to the intrusive activity, to ensure that all contacted (typically via the One-Call Agency) owner/operators have located and marked the underground utilities. The SM or Competent Person is responsible to determine/verify ownership of the property where the intrusive activity will occur, including any easements.

#### **Potholing or Daylighting**

The practice of exposing an underground facility by safe, *non-aggressive* excavation methods in order to determine the precise horizontal and vertical position and orientation of underground lines or utilities. potholing or daylighting are terms used to describe the excavating of buried facilities using an air or water "knife" coupled with vacuum excavation that exposes underground utilizes to the "daylight" – a positive and safe means of identification and confirmation of exact utility location.

#### **Target Rich Environment**

Areas where multiple utilities are known or suspected of being located, areas where utility locations are in question and/or difficult to obtain information on, or areas with known or suspect high-risk utilities. **Note: Military Bases (active or inactive) are to be considered "Target Rich Environments".**

#### **Underground Utility**

An underground or submerged conductor, pipe, or structure used in transporting or providing electric, communications service, gas, oil or oil product, sewage, storm drainage, water, or other service and appurtenances thereto. As used in this procedure, utility includes all underground appurtenances and structures.

The following are examples of the types of underground utilities that may be present in a given location:

- Natural gas pipelines
- Electric cables

- Water pipelines
- Fiber optic telecommunications lines
- Telephone cable lines
- Steam pipelines
- Gasoline, oil, or other fuels
- Sewer pipelines
- Vents for sewer and gasoline/diesel fueling systems
- Underground Storage Tanks (USTs)
- Abandoned underground structures containing hazardous materials, hazardous wastes, and radioactive materials

#### **Underground Utility Owner**

Any person, utility, municipality, authority, political subdivision or other person or entity who owns, operates, or controls the operation of an underground line/facility.

#### **White Lining**

The practice whereby the person (in this case WESTON or a Subcontractor) who intends to perform intrusive activities, pre-marks the site with an outline of the area where intrusive activities will occur. This involves the use of white paint, flags, stakes, or a combination thereof to mark the extent of where work is to be performed. The marking may vary depending on what intrusive activities are to be conducted. For example, for general excavation, an areal outline of the excavation shall be marked, while for drilling, the individual boreholes shall be marked. Studies have shown that pre-marking is a practice that does prevent utility contact incidents. Check State or local regulatory requirements to ensure compliance.

### **RESPONSIBILITIES**

#### **Competent Person**

The Competent Person shall be responsible for:

- Obtaining a copy of, and understanding the applicable regulations for the state of jurisdiction where the excavation activities are to be performed.
- Contacting the appropriate One-Call Agency or private locating service, as applicable.
- Recording One-Call locate numbers.
- If necessary, renewing One-Call locate numbers before expiration.
- Ensuring that white-lining of the area to be excavated is performed; if another equal or better protective measure is necessary because of the nature of the work, state/local regulation, or client requirements, the HASP should be amended to reflect the change.
- Ensuring that a "positive response" has been received from every utility owner/operator identified by the One-Call Agency (and any non-member utility as necessary) and that they have located their underground utilities and have appropriately marked any potential conflicts with the areas of planned intrusive activities prior to the start of intrusive work.

- Ensuring that appropriate means for supporting and protecting any exposed utility have been discussed with the utility owner and such means are available on-site.
- Ensuring that above-ground utilities and other appurtenances will not create a problem, or be impacted by WESTON activities. In all cases provisions for protection of any utility, structure, or appurtenance must be made.
- Ensuring that provisions for emergency actions and emergency shut-off/mitigation of utilities have been discussed with utility owners and field personnel.
- Ensuring that pictures are taken before, during, and after intrusive activities and placing such pictures in the project file. Pictures should provide visual documentation of actual site conditions, including but not limited to exposed utilities, methods used for bracing utilities and markings placed on the surface by utility locating services. Consideration should also include placing of a known object in the picture field to provide a "scale" for size/distance comparison.
- Completion and maintenance of the Underground Utilities Locating and Marking Checklist (Attachment A) and the Underground Utilities Management Checklist (Attachment B).
- Reviewing applicable Activity Hazard Analyses (AHAs) with all project members before work begins.
- Conducting training on communication protocols to be used by the excavation observer and equipment operator.
- Ensuring implementation of appropriate work practices during intrusive activities (including maintaining the prescribed buffer zone for use of aggressive methods).
- Conducting daily or more frequent (due to changes in conditions) inspections of the excavation area to make sure that all markings are intact.
- Providing the Field Safety Officer (FSO) with all required documentation on a daily basis.

#### Observer

Whenever intrusive operations with mechanized equipment are being conducted *within three feet of the outside edge of the buffer zone*, horizontally and vertically, an observer must be assigned to monitor the activities. The observer is responsible for:

- Maintaining a safe vantage point relative to digging machinery, excavation edge, and proximity to the hazard posed by the utility.
- Observing the operation to ensure that the operator stops operations if utilities are observed.
- Reviewing hand signals and other forms of communication with the operator. Note: hand signals should be as those identified under ANSI, OSHA, or the Corps of Engineers for Crane Hand Signals, or another, equally effective and understood system.
- Properly signaling the operator.
- Stopping the operation immediately if the observer's attention must be diverted even momentarily.
- Stopping the operation immediately if a hand signal or other directive is not followed. Operations will not resume until the observer and operator mutually agree that the reason(s) for not complying with the directive(s) are/is identified and fully corrected.
- Maintaining required records, such as logbook entries, or other, as requested by line management.

## **Line Management**

The PM or SM shall be responsible for:

- Establishing the site culture with the assistance of the FSO that ensures compliance with this FLD, as well as providing the leadership to “do the right thing” whenever unanticipated circumstances arise.
- Providing the necessary resources, including sufficient schedule for compliance with this FLD.
- Designating a Competent Person or ensuring that a subcontractor Competent Person is designated, prior to the start of work.
- Discussing intrusive activity liability with the Client prior to the start of work. Best practices for identification of underground utilities must be included with the proposal and/or HASP, as well as WESTON’s requirement for Client sign-off (if the Client is the property owner or if the Client selects the drilling/intrusive action location) when identifying specific work locations for intrusive activities. In cases where the client, such as EPA, will or cannot sign off on liability or provide indemnification, discussions with the appropriate client representatives on intrusive activities will be documented in the project file.

**Note: In any ‘target-rich’ work environment, best practices must include the requirement for potholing/daylighting or careful hand-digging – whenever possible (at least 5 feet below grade) – since these are recognized processes for visually verifying the exact location of underground utilities while minimizing the potential for utility damage.**

- **For excavations using aggressive methods in target-rich environments**, consideration should be given for establishing an agreement with an Emergency Response Contractor and/or the specific utility owner prior to the start of intrusive activities. This agreement should include specific emergency notification procedures for each utility identified to ensure that timely response can be accomplished in the event of a utility strike.
- Determining/verifying ownership of the property where the intrusive activity will occur, including any easements.
- Contacting all utilities not notified directly by the utility notification center, including those known to local personnel and the property owner.
- Obtaining Profit Center Manager approval for any deviations from this FLD, including best practices, or for addressing any set of circumstances not specifically addressed in this FLD that may place WESTON or its employees at risk.

## **Environmental, Health, and Safety Personnel**

The FSO shall be responsible for:

- Providing oversight on the implementation of the requirements contained in this FLD.
- Consulting with the PM, SM, Competent Person, and the appropriate Division Environmental, Health, and Safety Manager (DEHSM) (or Corporate EHS) on underground utility issues.
- Acting as the Competent Person or Observer as necessary and qualified.

## **Procedure**

The following sections provide the requirements and recommendations, which are intended to prevent injury to personnel, damage to infrastructure, and associated indirect effects associated with encountering

or contacting underground utilities during intrusive work. Underground utilities present multiple potential hazards that must be recognized before and during work which occurs near them, therefore, this procedure is divided into sections addressing underground utility identification and location, working around or near underground utilities, and actions to be taken in the event that underground utilities are encountered or contacted. Hazards that may be presented by underground utilities include explosion and fire, electrocution, toxic exposures, pathogens, and drowning.

#### Identifying and Locating Underground Utilities

The potential for underground utilities or other subsurface feature (e.g., subsurface mines) must be evaluated as early as possible in the planning phase for any project which involves intrusive activities. The following sections describe various methods for identifying and locating utilities on a site. The *Underground Utilities Locating and Marking Checklist* (Attachment A) and the *Underground Utilities Management Checklist* (Attachment B) must be completed before any activities meeting the definition of excavation are conducted. Attachment A is intended to be used as a guide during the process of locating and marking utilities in the area to be excavated. Attachment B is intended to be used as a guide in the overall process of underground utilities management during the course of the project.

**Note:** Attachments A and B or their equivalents must be used to document compliance with this FLD and will be subject to audit.

Prior to excavation all underground utilities must be located and identified by at least two of the following:

- The Utility Owner
- The Property Owner
- A Private or Public Utility Locating Service
- Review of the most current utility drawing, maps or other available records by an approved WESTON Competent Person
- Use of utility locating technology by a WESTON Competent Person or subcontractor – this includes the use of potholing or daylighting in a “target-rich” work environment or whenever a full clearance (without restrictions) cannot be obtained from a utility locating service.

As an aid in determining the potential for or existence of utilities follow the criteria outlined in Attachment C (Utilities Research Options).

#### Pre-Planning and the Site HASP

The site-specific HASP developed for the project must:

- Identify the location and types of underground utilities that are believed to be present on the site.
- Reference this procedure (FLD 34), and describe how it will be implemented on the project.
- Contain an AHA in which the hazards associated with underground utilities are identified, as well as the measures used to control them.
- Contain any site or contract-specific requirements (e.g., Corps of Engineers, EM 385-1-1, Section 25) that may be applicable.
- Contain clear and concise procedures to be followed in the event that contact with underground utilities occurs.

- Address underground utilities and potential associated scenarios in the emergency response section of the HASP.

#### "One-Call" Locating and Marking Services

Every state has utility marking service programs that have various names such as "One-Call", "Dig-Safe", "Call-Before-You-Dig", "Dig-Safely", and many others. These services will identify the types and locations of any utility that may exist in an area to be excavated, as long as the property is in the public domain.

- The appropriate One-Call service for the jurisdiction where the project is located must be contacted prior to beginning excavation work. The One-Call Agency should be given as detailed a description of the property as possible; address, cross street, utility pole numbers, physical description, etc.
- Notification to the One-Call service shall allow sufficient lead-time for the Agency to mark the utilities before excavation begins. The lead times vary, but range from two to ten days, depending on the state of jurisdiction.
- In the event the State or Local One-Call service number is in question call "811" (the Federal Call before You Dig Number) for access to the appropriate locator service.
- A complete listing of One-Call agencies and telephone numbers for all states is available in the "Call-Before-You-Dig Call Center Directory", which can be accessed on the Internet at the WebPage (<http://underspace.com/index.htm>) sponsored by "Underground Focus" magazine.
- Once notified, the One-Call Agency will provide the contractor with a unique "locate number" or "reference number". This reference number must be kept in the project files by the Competent Person or designee. Additionally, the reference numbers have expiration dates, which may vary depending on the particular One-Call Agency. The valid period of the locate number and required renew notification date shall be requested from the One-Call Agency.
- On a project with multiple contractors, each contractor must request a separate locate number. Under no circumstances will any other contractor or entity be allowed to "work under our locate number". Subcontractors to WESTON may excavate under the locate number secured by WESTON, provided that they are excavating within the area which was previously white-lined by WESTON and subsequently marked. **However, the One-Call Agency must be contacted and notified of this arrangement so that the subcontractor can be recorded as working under the existing locate number.** If a WESTON subcontractor will be excavating in an area not white-lined by WESTON, then the WESTON subcontractor must request a new locate. **Note: State and local requirements must be checked for local application of this procedure.**
- The area where work is to be performed shall be white-lined before the locating service goes to the site.
- It is good practice to arrange a pre-excavation meeting at the project site with the personnel performing the utility location and marking. This meeting will facilitate communications, coordinate the marking with actual excavation, and assure identification of high-priority utilities.
- The One-Call Agency should provide the identities of the utility owners that will be notified of the locate request. This information shall be recorded on the Underground Utilities Locating and Marking Checklist (Appendix A) and maintained in the project files. The contact person and phone number for each utility owner shall also be recorded. **Note that all utility owners are not members of the One-Call system.** This does not eliminate the need to contact a non-member owner if you have knowledge or suspect that excavation will impact their utility.

- The utility owners should provide a “positive response” relative to the locate request, which can consist of two types of action by the utility owner. The facility owner or operator is required to 1) mark its underground utilities with stakes, paint, or flags, or 2) notify the excavator that the utility owner/operator has no underground utilities in the area of the excavation.
- The positive responses shall be recorded on the Underground Utilities Locating and Marking Checklist (Attachment A) and crosschecked with the list of utility owners that the One-Call Agency stated they would notify. If it is discovered that a utility owner has not provided a positive response, then the One-Call Agency must be notified.
- Excavation shall not be conducted until positive responses have been received from all utility owners identified by the One-Call Agency as having underground utilities on the property.
- Before beginning excavation, the excavator must verify that the location marked was correct, and the distinct, color-coded markings of all utility owners are present.
- Examine the site to check for any visible signs of underground utilities that have not been located and marked such as pedestals, risers, meters, warning signs, manholes, pull boxes, valve boxes, patched asphalt or concrete pavement, areas of subsidence, fresh sod or grass, lack of grass or vegetation, and new trench lines.
- The markings placed by the utility owners should be documented by WESTON using a still, digital, or video camera, whenever practical and reasonable. The photo-documentation shall be maintained with the project files.
- The markings placed by the utility owners or marking services typically follow the American Public Works Association Uniform Color Code as described in ANSI Standard Z 535.1. This code follows:

**American Public Works Association Uniform Color Code**

Red		Electric Power Lines, Cables, Conduit
Orange		Communications, Telephone, Cable TV
Yellow		Gas, Oil, Steam, Petroleum or Gaseous Materials
Green		Sewers and Drains
Blue		Potable Water Systems
Purple		Reclaimed Water, Irrigation, Slurry Lines
Pink		Temporary Survey Markings
White		Proposed Excavation

**Note:** Unless otherwise specified in the utility clearance, such clearance will not be considered valid after 30 days from the date it was issued.

**Private Utility Locating and Marking Services**

- **One-Call agencies arrange for the identification and marking of underground utilities only on public property, up to the point of contact with private property.** In the event that activities are to be conducted on non-public properties, the presence, location, depth, and orientation of all underground utilities shall be ascertained through records review, including any site plot plans, utility layout plans, and as-built drawings available from the property owner, as well as through interviews with knowledgeable personnel associated with the property (See Attachment C). Additionally, for excavations using aggressive methods in target-rich

environments or other situations where utility locations are in question, the information gathered from these sources shall be verified by physical detection methods (non-aggressive), performance of a geophysical survey, or by procuring the services of a private utility locating and marking service. If any detection methods are to be self-performed, the requirements within this FLD must be followed. A list of vendors providing this service can be found in the *"Network of Underground Damage Prevention Professionals"* which can be accessed on the Internet at the *"Underspace"* WebPage (<http://underspace.com/index.htm>).

#### Self-Performance of Utility Locating and Marking

The techniques and instruments used to locate and characterize underground utilities can be extremely complicated and difficult to use effectively. Additionally, interpretation of the data generated by this instrumentation can be difficult. The utility marking services, as previously described are staffed by well-trained, experienced professionals who perform locating activities on a regular basis. For these reasons, it is most desirable that these professional services are used for utility location and marking on projects.

- In some instances on private property or in other areas not served by One-Call agencies (e.g., long-term projects where excavation is a primary task, and the presence of underground utilities is extensive) it may be prudent to self-perform locating and marking activities.
- If locating and marking is to be self-performed, all personnel using instrumentation will be trained on the use of the equipment that will be used, and the interpretation of the data.
- There are a variety of locating methods which may be utilized for self-performance of utility locating as categorized below:
  - Magnetic field-based locators or path tracers
  - Buried electronic marker systems (EMS)
  - Ground penetration radar-based buried –structure detectors
  - Acoustics-based plastic pipe locators
  - Active probes, beacons, or sondes for non-metallic pipes
  - Magnetic polyethylene pipe
- Before self-performing any underground utility locating on a project, approval must be obtained from the appropriate WESTON DEHSM or the Corporate EHS Director.

#### Working Near or Around Underground Utilities

After the site has been properly evaluated for the presence of aboveground utilities, underground utilities, and other appurtenances, intrusive activities may begin. Because there is no perfect way of eliminating the hazards presented by underground utilities, an effort must be made to perform the tasks following the direction and guidance as described by the following best practices that should be implemented during the execution of the project.

#### Work Site Review

Before beginning intrusive activities, a meeting shall be held between all members of the project team. This shall consist of a review of the marked utility locations with the equipment operators, observers, laborers, etc.

#### Preservation of Marks

During excavation, efforts must be made to preserve the markings placed by the utility owners until they are no longer required. If any markings are obliterated, the One-Call Agency must be contacted for re-marking. No intrusive activities are to take place if markings are not visible.

### Excavation Observer

Whenever intrusive operations are being conducted within three feet of the edge of the buffer zone, an observer must be assigned to monitor the activities. The observer will be designated each day, and a review of hand signals and other forms of communication between the observer and operator will be conducted. The directives of the observer will be followed precisely and immediately by those operating equipment.

### Excavation Within The Buffer Zone

Mechanical means of excavation may not be used within 36 inches (see Buffer Zone) of any marked or suspect utility until the utility has been exposed. Mechanical methods may be used, as necessary, for initial penetration and removal of pavement, rock or other materials requiring use of mechanical means of excavation provided a spotter is used. Once the underground utility has been exposed, further excavation must be performed, employing reasonable precautions to avoid damage to the utility, including but not limited to any substantial weakening of structural or lateral support, or penetration or destruction of the utility or its protective coatings. For purposes of this section, "mechanical means of excavation" means excavation using any device or tool powered by an engine except air vacuum or like methods of excavation.

A request to utilize aggressive excavation methods in the buffer zone may be made if:

- There is no other appropriate and reasonable alternative to using aggressive methods in the buffer zone; and
- The utility has been de-energized (and purged if necessary), verified as de-energized, and locked-out; or
- The depth and orientation of the utility has been adequately and visually determined through the use of non-aggressive methods such as air/hydro/vacuum excavation, potholing, probing, hand-digging, or a combination thereof; and
- For utilities containing electrical energy, the depth of the existing water table is below the location of the utility; and
- Request for the exemption has been submitted to the appropriate DEHSM and Profit Center Manager for approval.

The following conditions will apply to this request:

- Aggressive methods may be used in the buffer zone only to the extent allowed by the applicable state or other jurisdictional regulations.
- Appropriate physical protection measures for exposed utilities shall be implemented to eliminate the potential for equipment contact with utilities.
- The extent of the project excavation area to be covered by the exemption request must be specified in the request for exemption.
- When evaluating the use of aggressive excavation methods in the buffer zone, the DEHSM will consider the type of utility involved and the associated risk potential. Based on this evaluation, the Profit Center Manager and/or DEHSM may impose further conditions and requirements. Even if the above exemption conditions are met, the DEHSM has authority to deny the request.

Unless exempted according to the above provisions of this procedure, only non-aggressive methods may be used within the buffer zone. These methods are used in order to prevent mechanical contact with underground utilities, which could result in damage to the utility and create the potential for personal injury and property damage. Following are examples of non-aggressive excavation methods:

- Hand-digging
  - Non-conductive hand tools must be used when digging within the buffer zone surrounding underground electrical utilities.
  - If conductive hand tools must be used near electrical lines, then the FSO and/or DEHSM shall be consulted to determine additional requirements relative to safe electrical practices, procedures, and equipment.
- Hydro-excavation (water pressure).
- Air excavation (air pressure).
- Vacuum extraction (soil excavation/removal).
- Air excavation/vacuum extraction combination.
- Aggressive methods may be used for the removal of pavement over a utility, if allowed by the state regulations.

#### Protection of Underground Utilities

It is very important that consideration be given to the protection of underground utilities when performing adjacent intrusive activities. This is necessary not only to prevent physical damage and associated indirect effects, but also to prevent the potential for injury to employees and the public.

- When using aggressive excavation methods within the buffer zone around exposed underground utilities, physical protection must be used as required by OSHA in 29 CFR 1926.651. Basically, this involves creation of a physical barrier between the mechanized operation and the utility. The following are some possible types of physical protective measures:
  - Heavy timbers, similar to swamp or crane mats.
  - Sheets of plywood.
  - Blasting mats.
- Once exposed, underground utilities no longer have the support provided by surrounding soil and may need to be physically supported to prevent shifting, bending, separation, or collapse, which could result in damage to the utility, and possibly personnel. Following are suggested support methods:
  - Timber shoring underneath the utility.
  - Timbers or girders over the top of the excavation fitted with hangers that support the utility.
  - Design by a Professional Engineer for complicated or large applications.
- Utilities must also be protected from objects that may fall into the excavation such as rocks and equipment. This can be accomplished by following these guidelines:
  - Cast spoils as far away from the excavation as possible. Excavated and loose materials shall be kept a minimum of two feet from the edge of excavations.
  - Relocate large rocks, cobbles, and boulders away from the excavation and sloped spoils piles.

- When vehicles and machinery are operating adjacent to excavations, warning systems such as soil berms, stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.
- Scaling or barricades shall be used to prevent rock and soils from falling into the excavation.
- Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

#### De-Energizing Utilities

Utilities can carry many types of potential energy, including electricity, flowing liquids, liquids under pressure, or gasses under pressure. A release may happen if a utility conveyance is compromised and could result in personal injury, property damage, and other indirect effects. If the white lines of the proposed excavation area overlaps or extends into the buffer zone of a known underground utility, then if at all possible, that utility should be de-energized to physically prevent the transmission, flow, or release of energy. Conversely, if the buffer zone of the known utility lies outside of the white-lined, proposed excavation area, then de-energizing is not required.

- The owner of the utility shall be contacted to determine the feasibility and methodology of de-energizing the utility. Plenty of lead-time should be provided for this since it may take utility companies weeks to de-energize some utilities.
- Depending on the utility and the material being conveyed, isolation points which may be suitable for de-energizing include but are not limited to the following:
  - Electrical circuit breakers
  - Slide gate
  - Disconnect switches
  - Piping flanges
  - Other similar devices
- When utilities are de-energized, it must be verified by demonstration. This can be accomplished by methods such as, testing equipment, switching on a machine or lighting, or opening a valve. For any current-carrying electrical equipment, such as cables or electrical panels, successful de-energizing must be certified through the use of appropriate electrical testing equipment and qualified personnel.
- Whenever a utility is de-energized, a means of ensuring that the energy isolation device and equipment cannot be operated until the device is removed must be provided.
- When de-energizing and locking out of utilities is practiced, the provisions of FLD 42 Lockout/Tagout shall be followed, as applicable.

#### Damage Discovery

During excavation, utility damage may be discovered which is pre-existing or otherwise not related to a known contact. Disclosure to the utility owner is very important because the possibility of utility failure or endangerment of the surrounding population increases when damage has occurred. The utility may not immediately fail as a result of damage, but the utility owner or operator must be afforded the opportunity to inspect the utility and make a damage assessment and effect repairs if necessary. The following guidance applies:

- Observe and photograph the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, or other damages to utility lines, conduits, coatings, or cathodic protection systems.

- The owner of the affected utility must be contacted immediately.
- The One-Call Agency or private location service must be contacted immediately.
- A Notification of Incident (NOI) Report will be used to document such a discovery.

#### Encountering Unexpected Underground Utilities

It is possible that underground utilities will be encountered in locations that have previously been "cleared" of having underground utilities by the locating service, or are found outside of the area, which has been marked as having underground utilities. In either case, if this occurs, the following applies:

- Site personnel must be warned and moved to a safe location; equipment engines and ignition sources should be turned off, if possible, as the operator is exiting his/her equipment.
- Intrusive activities must be stopped.
- The owner of the affected utility must be immediately contacted.
- The One-Call Agency or private location service must be contacted immediately.
- The PM, SM, and FSO must be notified.
- No further intrusive activities may be conducted until:
  - The One-Call Agency/private location service and/or the subject utility owner visit the site;
  - Identification of the utility owner and the type of material/energy being conveyed by the utility has been made; and
  - The orientation and depth of the subject utility has been determined and suitably marked.
- A NOI Report must be completed. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.

#### Contacting Underground Utilities

If excavation or other equipment being used for intrusive activities makes contact with an underground utility, the following guidelines apply:

- Site personnel must be warned and moved to a safe location; equipment engines and ignition sources should be turned off, if possible, as the operator is exiting his/her equipment.
- Intrusive activities must be stopped immediately.
- Observe the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, scratched coatings, cathodic protection compromise, material leakage, obvious electrical energy.
- Move all personnel to the evacuation meeting point as described in the HASP.

**EXCEPTION:** *If an electrical line has been contacted and it is your belief that equipment (such as an excavator) is electrically energized, do not approach the equipment. Order the operator to remain in the equipment until emergency personnel can de-energize the source (unless the equipment is on fire, at which time the operator should jump off of the vehicle and shuffle along the ground to a safe area). Shuffling is required because current flows outward through the soil in a ripple pattern called a power gradient, creating a pattern of high and low potential. Shuffling decreases the chance that these gradients could be bridged, causing current to flow through the body, resulting in electrocution.*

- Secure the area to prevent the public from entering.
- Contact emergency responders as specified in the HASP.
- Immediately contact the One-Call Agency or if known, the utility owner.
- Notify the PM, SM, FSO and DEHSM.
- No further intrusive activities may be conducted until:
  - The utility owner inspects the scene and after repairs, verifies that all danger has passed.
  - The orientation and depth of the subject utility has been determined and suitably marked.
  - Permission from the emergency responders to resume work has been given.
- A WESTON NOI Report must be completed. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.
- State and Local regulations must be reviewed to determine if reporting to any additional agencies is required.

## **ATTACHMENTS**

Attachment A – Underground Utilities Locating and Marking Checklist

Attachment B – Underground Utilities Management Checklist

Attachment C – Utilities Research Options

Attachment D – Sources of Information

Informational Addendum 16 June 2010

**ATTACHMENT A  
UNDERGROUND UTILITIES LOCATING AND MARKING CHECKLIST**

*Weston Solutions, Inc.*

To be Completed by PM and/or "Competent Person"  
Complete Form as Location/Marking Progresses and Maintain in Site Files

<b>PROJECT INFORMATION:</b>	<b>Location:</b>
<b>Project Name:</b>	<b>Task/Activity:</b>
<b>WESTON Competent Person:</b>	<b>Start Date of Work:</b>
<b>WESTON Subcontractor:</b> <input type="checkbox"/> No <input type="checkbox"/> Yes:	<b>Private Locating Service Required:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Subcontractor Competent Person:</b>	<b>If Not, Explain:</b>
<b>Property Owner:</b>	
<b>NOTIFICATION:</b>	
<b>Locating Service Name:</b>	<b>Locating Service Tel. Number:</b>
<b>Date Locating Service Notified:</b>	<b>Locate Ticket Number:</b>
<b>Address of Property to be Marked:</b>	<b>Locate Ticket Expiration Date:</b>
<b>Nearest Intersecting Street:</b>	
<b>Are There Any Utilities on the Properties That the Locating Service Will Not Contact?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Specify:</b>	

*Enter Utility Information in Table 1 Below. In Addition to Utility Locating Services, Consult Client, Utility Owners, Drawings, Facility Personnel, Maintenance Personnel, Municipalities (See Appendix C).*

**Table 1. On-Site Utility Information**

Name of Utility Company	Type of Utility	Color Code	Utility Present On-Site?	Emergency Phone Number	Date Marks Completed
	Electric	RED			
	Communications, Phone, CATV	ORANGE			
	Gas, Oil, Steam, Petroleum	YELLOW			
	Sewers, Drains	GREEN			
	Potable Water	BLUE			
	Reclaimed Water, Irrigation	PURPLE			
	Temporary Survey Markings	PINK			
To be performed by excavator prior to utility mark-out.	Proposed Excavation	WHITE			

White-Lining Completed?

☐ No Explain: \_\_\_\_\_ ☐ Yes: Date: \_\_\_\_\_ By Whom? \_\_\_\_\_

**LOCATING AND MARKING:**

Have All Utilities Identified in Table 1 Been Marked?

☐ Yes ☐ No (If No, Contact Locating Service for Resolution)

Problem(s) With Markings?

☐ Yes ☐ No ☐ No Marks ☐ Incorrect Location ☐ Too Wide

☐ Other: \_\_\_\_\_ ☐ Not All Utilities Marked Per Table 1 (notify marking service)

Measurements Taken: ☐ Yes ☐ No

Documentation of Marks: ☐ Photos ☐ Video ☐ Other: \_\_\_\_\_

**EXCAVATION:**

Utilities Accurately Marked? ☐ Yes ☐ No

If no, describe: \_\_\_\_\_

Were Unmarked or Mis-Marked Utilities Encountered? ☐ Yes ☐ No

If Yes, Specify: \_\_\_\_\_

Locating Service Notified? ☐ Yes ☐ No

Will Excavation Continue Past Locate Number Expiration? ☐ Yes ☐ No

If Yes, Locate Number Renewed? ☐ Yes ☐ No New Expiration Date: \_\_\_\_\_

Any Other Problems/Concerns? Specify: \_\_\_\_\_

Form Completed By:	Signature:	Date:
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**ATTACHMENT B**  
**UNDERGROUND UTILITIES MANAGEMENT CHECKLIST**

*Weston Solutions, Inc.*

To be Completed by PM and/or "Competent Person"

Complete Form as Project Progresses and Maintain in Site Files.

PHASE	TASK	YES	NO	NA	COMMENTS Required if Response is No or NA. (Reference Item Number)
<b>Pre-Planning</b>	1 Excavation/Best Practices in Work Scope?				
	2 Underground Utilities Identified?				
	3 Competent Person Assigned?				
	4 Has a Copy of the Applicable State Regulations Been Obtained, Read, Understood?				
	5 EHS Plan Addresses Underground Utilities? (AHAs, Contingency Plan, State Regulations Appendix)				
<b>Identifying, Locating and Marking</b>	6 Locating and Marking Checklist Initiated? (Attachment A)				
	7 Identification and Address of Property Determined, Including Nearest Intersection?				
	8 One-Call Agency Contacted?				
	9 Additional Locating and Marking Required on Property? (One-Call agency marks to public property line only)				
	10 Additional Marker/Locator Identified?				
	11 Additional Marker/Locator Qualified?				
	12 Weston Self-Performing Location and Marking?				
	13 If Yes to 12 Above, Approval From Division EHS Manager?				
	14 Area of Excavation "White-Lined" by WESTON?				
	15 WESTON Present When Markings Completed?				
	16 All Utilities Marked? (Refer to Attachment A, Table 1)				
	17 All Markings Photo/Video Documented?				

PHASE	TASK		YES	NO	NA	COMMENTS
						Required if Response is No or NA. (Reference Item Number)
<b>Identifying, Locating and Marking – Continued</b>	18	Area Checked for Signs of Previous Excavation? (Subsidence, new grass, patching, etc)				
	19	All Applicable Information Recorded on Attachment A?				
	20	Multiple Contractors Excavating On-Site?				
	21	Separate Locate Requests for All Contractors?				
	22	WESTON Subcontractors Excavating in WESTON White- Lined Area(s)?				
	23	If Yes to 22 Above, One-Call Agency Contacted to Determine if WESTON Subcontractor Can be Added to Existing Locate Ticket?				
<b>Excavation Activities</b>	24	Meeting and Site Walkover Conducted with Project Personnel?  (Managers, Equipment Operators, Laborers, Competent Person, Excavation Observer, etc)				
	25	AHA and HASP Review Conducted With Personnel?				
	26	Do Site Activities Have Potential to Obliterate Utility Markings?				
	27	If Yes to 26 Above, Have Provisions Been Made to Preserve Markings?				
	28	Has an Excavation Observer Been Designated to Monitor Excavation When Occurring within 3 Feet of the Buffer Zone?				
	29	Have Operator and Observer Reviewed Commands and Signals?				
	30	Has WESTON-Required Buffer Zone Been Marked on Either Side of Markings Placed by Locator?				

PHASE	TASK		YES	NO	NA	COMMENTS
						Required if Response is No or NA. (Reference Item Number)
Excavation Within Buffer Zone	31	Is Excavation Within The Buffer Zone Absolutely Necessary?				
	32	If Yes to 31 Above, Can Non-Aggressive Methods Be Used For Excavation In The Buffer Zone? If Yes, Identify Appropriate Non-Aggressive Methods.				
	33	If No to 32 Above, Has a Buffer Zone Exemption Request Been Approved? If No, then Aggressive Methods May Not Be Used in The Buffer Zone.				
	34	If Yes to 33 Above, Has the Utility Been De-Energized, Purged, Verified/Tested, and Locked-Out? Or,  Has The Depth and Orientation of the Utility Been Adequately and Visually Determined Through The Use of Non-Aggressive Methods?				
	35	If Yes to 34 Above, Have All of The Following Conditions Been Met?  For Utilities Containing Electrical Energy, Is The Depth of The Water Table Below The Depth of The Utility?  Have Regulations Been Consulted to Determine Specific State Requirements Relative to Excavating in The Buffer Zone?  Have Appropriate Physical Protection Measures Been Implemented to Prevent Equipment Contact With Utilities and to Prevent Damage to Utilities?  If No to Any of The Above Conditions, Then Only Non-Aggressive Excavation Methods May Conducted in The Buffer Zone, Since The Conditions of The Exemption Have Not Been Satisfied.				
Working Around Exposed Utilities	36	If Necessary, Have Provisions Been Made to Support the Utility During Work Activities?				
	37	Have Spoils Been Placed as far Away From the Excavation as Feasible?				

PHASE	TASK		YES	NO	NA	COMMENTS
						Required if Response is No or NA. (Reference Item Number)
<b>Working Around Exposed Utilities – Continued</b>	38	Has the Utility Been De-Energized? (If Any Portion of the Buffer Zone around a Utility is Inside of the White-Lined Area)				
	39	Has the Isolation Point for the De-Energized Utility Been Physically Locked-Out?				
	40	If No to 39 Above, Has a Spotter Been Assigned to Monitor Isolation Point?				
	41	If Yes to 40 Above, Does the Spotter Have Adequate Communications? (Radio, Telephone, etc)				
	42	Has the Isolation Point Been Tagged?				
<b>Damage Discovery</b>	43	Has Pre-Existing Damage to a Utility Been Discovered During Excavation?				
	44	If Yes to 43 Above, Has the One-Call Agency and/or Utility Owner Been Notified?				
	45	If Yes to 43 Above, Have Photographs Been taken?				
<b>Encountering or Contacting Underground Utilities</b>	46	Have Utilities Been Encountered in Locations That Have Not Been Marked?				
	47	If Yes to 46 Above, Has the One-Call Agency or Other Locating Service Been Contacted?				
	48	If Yes to 46 Above, Has the PM and Appropriate DSM Been Notified?				
	49	If Yes to 46 Above, Has a WESTON Notification of Incident (NOI) Report Been Completed? (Include Photographs)				
	50	Have Excavation Equipment Come In Contact With Underground utilities?				
	51	If Yes to 50 Above, Were Intrusive Activities Immediately Curtailed?				

PHASE	TASK		YES	NO	NA	COMMENTS
						Required if Response is No or NA. (Reference Item Number)
Encountering or Contacting Underground Utilities – Continued	52	If Yes to 50 Above, Has a Damage Determination Been Made From a Safe Distance?				
	53	If Yes to 50 Above, Has the Area Been Secured?				
	54	If Yes to 50 Above, Have Emergency Responders Been Notified?				
	55	If Yes to 50 Above, Has the Locating Agency and/or Utility Owner Been Notified?				
	56	If Yes to 50 Above, Have State and Local Reporting Requirements Been Met?				
	57	If Yes to 50 Above, Were Intrusive Activities Curtailed Until Inspection From Utility Owner, Orientation and Depth of Utility Was Determined and Marked, Permission From Emergency Responders Given?				
	58	If Yes to 50 Above, Has a WESTON Notification of Incident (NOI) Report Been Completed? (Include Photographs)				

CHECKLIST COMPLETED BY:

NAME

SIGNATURE

DATE

NAME

SIGNATURE

DATE

**ATTACHMENT C**  
**UTILITY RESEARCH OPTIONS**

In the course of determining and verifying underground utility location it is expected that a minimum of two resources will be used. As a means of assisting the search for sources, the following is offered.

**Records Sources:**

- ☐ Utility Section of the State DOT or other Public Agency
- ☐ One-Call Center
- ☐ Public Service Commission or similar organization
- ☐ County Clerks Office
- ☐ Landowner
- ☐ Internet or Computer database
- ☐ Visual Site Inspection
- ☐ Utility Owner

**From the Above Collect:**

- ☐ Previous construction plans in the area
- ☐ Conduit maps
- ☐ Direct-Buried Cable records
- ☐ Distribution maps
- ☐ Service record maps
- ☐ As-built and record drawings
- ☐ Field notes
- ☐ County, city, utility owner or other geographic information system database
- ☐ Circuit diagrams
- ☐ Oral histories (current or previous employees, residents).

**Review Records and Obtain Information For:**

- ☐ Indications of additional and/or other available records
- ☐ Duplicate information that lends credibility to data
- ☐ Any additional need for clarifications from owners/others

## **ATTACHMENT D SOURCES OF INFORMATION**

### **Organizations**

- Common Ground Alliance  
<http://www.commongroundalliance.com/wc.dll?cga~toppage>
- Center for Subsurface Strategic Action (CSSA)  
<http://underspace.com/cs/index.htm>
- DigSafely  
<http://www.digsafely.com/digsafely/default.asp>
- National Utility Contractors Association (NUCA)  
<http://www.nuca.com/>
- National Utility Locating Contractors Association (NULCA)  
<http://underspace.com/nu/index.htm>
- Underground Focus Magazine  
<http://underspace.com/uf/index.htm>
- NUCA State Listing of One-Call centers  
<http://www.nuca.com/>
- Utility Safety Magazine  
<http://www.utilitysafety.com/>

### **Vendors and Commercial Sites**

- RadioDetection, Inc. (Detection Instruments)  
<http://www.radiodee.com/>
- Heath Consultants (Detection Instruments)  
<http://www.heathus.com/>
- Ben Meadows Company (Detection Instruments)  
<http://www.benmeadows.com/cgi-bin/SoftCart.exe/index.html?E+scstore>
- So-Deep, Inc. (Complete Utilities Services)  
<http://www.sodeep.com/>
- Concept Engineering Group, Inc. (Air Excavation Equipment)  
<http://www.air-spade.com/index.html>
- Rycom Instruments, Inc. (Detection Instruments)  
<http://www.rycominstruments.com/>

- Schönstedt Instrument Company (Detection Instruments)  
<http://www.schonstedt.com/>
- Forestry Suppliers, Inc. (Fiberglass Probe – “Fiberglass Tile Probe”, Part #77543,  
Approx. \$20.00, Telephone 800-647-5368)  
<http://www.forestry-suppliers.com/>

#### **REFERENCES**

Common Ground Study of One-Call Systems and Damage Prevention Best Practices, August 1999,  
Sponsored by US DOT.

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**INFORMATIONAL ADDENDUM**  
**16 JUNE 2010**

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## **Overview of Underground Utility Detection Methods**

### **Induction Utility Locators**

Induction utility locators operate by locating either a background signal or by locating a signal introduced into the utility line using a transmitter. There are three sources of background signals that can be located. A utility line can act like a radio antenna, transmitting electromagnetic signals that can be picked up with a receiver. AC power lines have a 50HZ signal associated with them. This signal occurs in all active AC power lines regardless of voltage. Utilities in close proximity to AC power lines or used as grounds may also have a 50HZ signal that can be located with a receiver. A signal can be indirectly induced onto a utility line by placing the transmitter above the line. Through a process of trial and error, the exact above position can be determined. A direct induced signal can be generated using an induction clamp. The inductor clamp induces a signal on specific utilities. This is the preferred method of tracing, where possible. By virtue of the closed loop, there is little chance of interference with the resulting signals. When access can be gained to a conduit, a flexible insulated trace wire can be used. The resulting signal loop can be traced. This is very useful for non-metallic conduits. Finally, these signals can be located horizontally on the surface using a receiver. The receiver is moved across the estimated location of the utility line until the highest signal strength is achieved. This is the approximate horizontal location of the utility. The receiver is then rotated until minimal signal strength is achieved. This will give the approximate orientation of the utility. Vertical depth, however, derived from this equipment is subject to gross error.

### **Magnetic Locators**

Ferrous Metal or Magnetic locators operate by indicating the relative amounts of buried ferrous metals. They have limited application to locating and identifying utility lines but can be very useful for locating underground storage tanks (UST's) and buried manhole covers or other subsurface objects with a large ferrous metal content.

### **Electromagnetic Surveys**

Electromagnetic survey equipment is used to locate metallic utilities. This method pulses the ground and records the signal retransmitted back to the unit from subsurface metal. Particularly useful for locating metal pipelines and conduit, this device also can help locate other subsurface objects such as UST's, buried foundations (that contain structural steel), and pilings and pile caps (that also contain steel).

### **Ground Penetrating Radar**

Ground Penetrating Radar (GPR) is an electromagnetic method that detects interfaces between subsurface materials with differing dielectric constants (a term that describes an electrical parameter of a material). The GPR system consists of an antenna, which houses the transmitter and receiver; and a profiling recorder, which processes the received signal and produces a graphic display of the data. The transmitter radiates repetitive short-duration EM signals into the earth from an antenna moving across the ground surface. Electromagnetic waves are reflected back to the receiver by interfaces between materials with differing dielectric constants. The intensity of the reflected signal is a function of the contrast in the dielectric constant at the interface, the conductivity of the material, which the wave is traveling through, and the frequency of the signal. Subsurface features which may cause such reflections are: 1) natural geologic conditions such as changes in sediment composition, bedding and cementation horizons, voids, and water content; or 2) man-introduced materials or changes to the subsurface such as soil backfill, buried debris, tanks, pipelines, and utilities. The profiling recorder receives the signal from the antennae and produces a continuous cross section of the subsurface interface reflections, referred to as reflectors.

Depth of investigation of the GPR signal is highly site specific, and is limited by signal attenuation (absorption) of the subsurface materials. Signal attenuation is dependent upon the electrical conductivity of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivity such as clays and brackish groundwater, and lowest in relatively low conductivity materials such as unsaturated sand or rock. Maximum depth of investigation is also dependent on antennae frequency and generally increases with decreasing frequency; however, the ability to identify smaller features is diminished as frequency decreases.

The various GPR antennas used are internally shielded from aboveground interference sources. Accordingly, the GPR signal is minimally affected by nearby aboveground conductive objects such as metal fences, overhead power lines, and vehicles.

A GPR survey is performed by towing an antenna across the ground along predetermined transect lines. The antennae is either pulled by a person or towed behind a vehicle. Preliminary GPR transects are performed over random areas of the site to calibrate the GPR equipment and characterize overall site conditions. The optimum time range settings are selected to provide the best combination of depth of investigation and data resolution for the subsurface conditions at the site. Ideally, the survey is performed along a pre-selected system of perpendicular or parallel transect lines. The configuration of the transect lines is designed based on the geometry and size of the target and the dimensions of the site. The beginning and ending points of the transect lines and grid intersection points, or nodes, are marked on the ground with spray paint or survey flags. A grid system is used to increase the probability of crossing the short axis of a target providing a more definitive signature in the data. The location of the antenna along a transect line is electronically marked on the cross section at each grid intersection point to allow correlation of the data to actual ground locations. The location of the targets can be marked on the ground surface using spray paint or survey flags.

#### **Acoustic Location Methods**

Acoustic location methods generally apply to waterlines. A highly sensitive Acoustic Receiver listens for background sounds of water flowing; (at joints, leaks, etc.) or to sounds introduced into the water main using a transducer. This method may have good identification results, but can be inaccurate. Acoustics can also being utilized to determine the location of plastic gas lines.

## **FLD 40 STORAGE TANK REMOVALS AND DECOMMISSIONING**

### **RELATED FLDs AND PROGRAMS**

*Occupational Noise and Hearing Conservation Program*

*FLD 02 – Inclement Weather*

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*FLD 08 – Confined Space Entry Program*

*FLD 10 – Manual Lifting and Handling of Heavy Objects*

*FLD 12 – Housekeeping*

*FLD 16 – Pressure Systems: Compressed Gas Systems*

*FLD 22 – Heavy Equipment Operation*

*FLD 24 – Aerial Lifts/Manlifts*

*FLD 25 – Working at Elevation/Fall Protection*

*FLD 26 – Ladders*

*FLD 27 – Scaffolding*

*FLD 28 – Excavating/Trenching*

*FLD 30 – Hazardous Materials Use and Storage*

*FLD 31 – Fire Prevention and Protection Planning*

*FLD 32 – Fire Extinguishers Required and Requirements*

*FLD 34 – Utilities*

*FLD 35 – Electrical Safety*

*FLD 36 – Welding/Cutting/Burning*

*FLD 37 – Pressure Washers/Sandblasting*

*FLD 38 – Hand and Power Hand Tools*

*FLD 54 – Benzene Exposure Control Plan*

### **INTRODUCTION**

Both aboveground and below ground storage tank removal and decommissioning present numerous hazards and represent significant risk to site workers, the environment, and the public. The proper planning and completion of this work will ensure the safety of personnel performing the task and the public. The types of hazards encountered include:

- Fires and explosions from the ignition of flammable or combustible vapors
- Toxic, corrosive, or reactive materials contained in the tank
- Working in confined spaces and excavations
- Pressurized or energized lines and utilities
- Mechanical equipment and heavy equipment operation
- Falls when working at elevations and on weathered and corroded structures
- Hotwork, including welding and cutting
- Hand and power tools

In addition to the guidance in this operating procedure and the field operating procedures referenced above, procedures presented in American Petroleum Institute (API) Publications 1604, 2015, 2015A and 2015B, National Fire Protection Association (NFPA) documents, and all applicable state and local regulations relating to storage tank removal and decommissioning, must be considered for the safe removal and decommissioning of storage tanks prior to initiating field work.

## **KEY PERSONNEL AND RESPONSIBILITIES**

### **Site Supervisor and/or Site Safety Officer**

The Site Supervisor or Field Safety Officer (FSO) will:

- Ensure this procedure and all elements of the Site Health & Safety Plan (HASP) and Weston's Environmental Compliance, Health, and Safety (EHS) Program are implemented.
- Constantly reassess site conditions and work practices to recognize unanticipated unsafe practices or conditions and take appropriate corrections, including cessation of operations until the hazard is abated.
- Ensure all employees are familiar with these procedures and the requirements of the HASP.

### **Site Emergency Coordinator**

The Site Emergency Coordinator, who can also be the certified remover, will:

- Respond to all non-routine events that occur during tank removal or decommissioning activities including:
  - Medical Emergencies
  - Confined Space Rescue
  - Spills or Releases
  - Fire or Explosion
  - Security Breaches
- Provide guidance and coordination in response actions to ensure the safety of personnel and the public and to ensure that all activities are completed in accordance with applicable regulations and WESTON policy.
- Be familiar with all contingencies and contingency response plans specific to the site.
- Be prepared at all times during site operations to implement each Contingency Plan.

### **Project Manager**

The Project Manager, or his/her designated alternate, will:

- Approve the HASP with signature.
- Ensure implementation of the HASP.
- Facilitate any required corrective actions.

### **Site Personnel**

All employees working on the site will follow the requirements of this procedure.

## **PLANNING ELEMENTS**

The following steps outline the process to follow to plan an effective tank removal and decommissioning. These actions will be completed by the Site Supervisor or FSO, with input, as necessary, from the Site Emergency Coordinator and others as identified.

## **Background Information and Communications**

- Obtain information regarding present and past tank contents. Examples of sources for information include Material Safety Data Sheets (MSDSs), labels on tanks and records of product received and shipped from the site, and State and Local storage tank registration requirements. The project HASP and WESTON EHS Portal site are also sources for product information. The API and NFPA documents provide recommendations for inerting for safe handling and dismantling of storage tanks which cannot be completely emptied or cleaned.
- Confirm the product information and update the project HASP, as necessary.
- Revise and update all Contingency Plans to ensure that identified response actions are clearly identified and consistent with WESTON requirements and applicable regulations.
- Review all procedures including response actions and relevant chemical information with personnel before beginning work.
- Implement an effective HAZCOM program to include multi employer worksite conditions, as appropriate.

## **Site Access, Control Access, Characterization and De-energization**

- Establish a site control system using tape or other readily identifiable system to mark boundaries and properly sized work zones.
- Control accesses to the site to ensure only essential and authorized personnel are in the work area.
- Set up decontamination lines.
- Implement a Zero Energy procedure to identify and shutdown all sources of energy, including utilities, electrical devices, pressurized lines, steam lines, chemical and gas lines; and stored mechanical energy; such as agitators or other mechanical implements in and around each tank. The steps in the process include instituting lockout/tagout, de-energization, blocking, line breaking and blinding, shielding and guarding, or other acceptable controls to avoid exposure.
- Monitor the area around tanks and conduct atmospheric testing at appropriately positioned/located openings on the tanks to evaluate explosive, oxygen rich or deficient and toxic environments. Continue to monitor according to the HASP air monitoring plan throughout the removal process. The results of atmospheric testing will be evaluated with respect to lowest established exposure limits and appropriate actions taken.

## **Preparation of Tank(s):**

The following steps will be completed by the Site Supervisor or FSO, with input, as necessary, from the Emergency Coordinator and others as identified:

- Disconnect all fill and removal lines from the tank(s) in a manner to ensure no spillage of contents or fires. Safe line breaking procedures as presented in applicable industry standards and practices will be used.
- Monitor the atmosphere inside the tank at as many locations as possible and at all levels from the top to just above the content level. Take appropriate precautions as indicated below:
- Unknown contents - If contents of tank are unknown, there is concern about the contents, or there are no samples to confirm the contents, the opening of an unknown tank will be completed with

personnel wearing Level B personal protective equipment (PPE) using remote opening devices and workers protected by blast/splash shields in accordance with 29 CFR 1910.120 (j).

- Known contents, elevated Combustible Gas Indicator (CGI) readings – If the CGI reading at any level inside the tank is 10% of the lower explosive limit (LEL) or greater, the tank must be purged with air, while controlling the emissions and performing air monitoring in the vicinity of the tank, or inerted to maintain oxygen (O<sub>2</sub>) concentration less than 8%. Bonding and grounding will be installed, prior to initiating activities, including material handling or cleaning. The tank must be inerted, if handling of the tank could change conditions and increase the concentration of combustible gas or vapors.
- Remove liquid contents of tanks using appropriate equipment and practices, for example bonding and grounding, and procedures to contain and control potential spills.

### **Limitations**

Each tank removal/cleanout may present unique hazards which are not covered by this procedure and for that reason every application of this procedure must be reviewed and approved by the Division Environmental, Health, & Safety Manager (DEHSM) before work begins, with the review completed by, preferably, a tank cleanout specialist.

Likewise, even after the use of this procedure is approved, the FSO must exercise vigilance. Whenever unusual conditions are discovered which could possibly affect safety during tank work, those conditions must be described to the DEHSM before work continues. In particular, no torch, arc or saw cutting shall take place, unless performed in accordance with procedures in this document, including approval from the DEHSM.

Many localities have ordinances or regulations which require the use of alternate procedures for making tanks fire-safe. Where local procedures exist, they will be fully understood and described in a written plan. The job-specific procedures for the tank removal will be approved by a qualified individual, such as a tank removal specialist, with the DEHSM before being implemented.

### **THE PROCESS STEPS FOR A TANK CONTAINING FUEL OIL AND GASOLINE**

The following procedures for tank remediation and decommissioning are based on the assumption that the tank contained either gasoline or fuel oil and that the attached tank schematic accurately describes the tank installation. This procedure does not apply to tanks located within buildings or other enclosures which could limit the natural ventilation in the work area outside the tank. In some cases, this procedure may be extended to tanks which contained other material with basically similar hazards, but this may only be done with the specific approval of the DEHSM.

#### **Identification of General Hazards and Controls**

This section discusses general issues concerning the hazards and the controls when removing or decommissioning storage tanks that contain fuel oil and gasoline.

#### **Hazards**

- Gasoline and Fuel Oil, including waste oil tanks.
  - Gasoline and fuel oil are toxic. Gasoline can contain benzene, tetraethyl lead, ethylbenzene, toluene, and xylene.

- Gasoline is a flammable liquid.
- Fuel oil is a combustible liquid but can produce flammable vapors if heated.
- Gasoline and fuel oil vapors when heated in enclosed spaces can expand rapidly to result in explosions.
- Unexpected hazardous materials, such as waste solvent, are sometimes deposited in tanks without the owner's knowledge.
- General construction site hazards, including power equipment, operating vehicles, falls, slips and trips, and changing work conditions and environmental conditions.
- Excavation hazards.
- Utilities located underground and overhead.

### Controls

The following procedures, or approved alternatives, will be followed to control site fire hazards.

- **Flammability Assessment.** This evaluation involves identifying the flammability of materials and liquids that could be encountered on the site and identifying the operations to be performed which have the potential to create hazardous conditions, such as fires, if performed incorrectly in the vicinity of combustible and flammable materials.

**Source Assessment.** In this review, the tasks to be performed are evaluated and assessed to identify their potential to generate heat and ignition sources. In addition, this assessment will identify locations and concentrations of toxic vapors.

- **Controls Identification.** The information from the Flammability Assessment and the Source Assessment are combined to identify the appropriate control strategies. The controls include engineering controls, such as inerting the space and placing fire-resistant blankets around the work area; administrative controls such as using a fire watch and performing the task at a location away from the flammable material; and personnel protective equipment, such as basic hot work clothing.

For more information concerning fire hazards and fire control strategies see FLD 31.

Whenever possible, due to the potential for flammable or explosive atmospheres, intrinsically safe equipment will be used.

Site-specific training must be provided and documented to all personnel to ensure that they understand the procedures and practices that will be used at the site.

The following table identifies the criteria to evaluate the results of sampling obtained using the Combustible Gas Indicator and Oxygen Meter (CGI/O2), the Photoionization Detector (PID)/Flame Ionization Detector (FID), and colorimetric indicator tubes.

**Table 1: Action Levels**

INSTRUMENT	TASK	LEVEL	ACTION
<b>Fuel Oil</b>			
FID/PID	All	5 units above background	go to level C

INSTRUMENT	TASK	LEVEL	ACTION
(breathing zone)		50 units above background	go to level B
		100 units above background	stop work and reevaluate WORK PLAN
CGI (inside tank)	2, 4, 5, 6, 7	>10 % LEL	Evacuate work area, inert tank
CGI (Outside tank low areas)	1, 2, 4, 5, 6, 7	>20 % LEL	Evacuate work area find source and control
O2	2, 4, 5, 6, 7	<19.5 %	Go to Level B
		>23%	Evacuate, find source of O2, vent until within normal range
Gasoline			
FID/PID (breathing zone)	All	1-5 units above background	Go to Level C
		>5 units above background	Use colorimetric detector tube for benzene
		>50 units	Go to Level B
		>500 units	Evacuate work area and ventilate or purge until below 250 units.
Colorimetric tube (0.5 PPM benzene, breathing zone)		>1 PPM for 2 successive readings 10 min. apart.	Go to Level B
CGI (inside tank)	2, 4, 5, 6, 7	>10% LEL	Purge tank
CGI (outside tank)	4, 5, 6, 7	>20 % LEL	Evacuate work area, find source and low areas control
O2 (breathing zone)	2, 4, 5	>19.5 O2	Go to Level B
		> 23% O2	Find source of O2, vent until within normal range

### Task by Task Risk Analysis and Procedures

The following sections address in greater detail specific elements and activities for the effective remediation and decommissioning of a tank. While the discussion identifies tasks, the sequence of the tasks in this FLD is not necessarily the sequence for the completion of a tank removal and decommissioning. The specific sequence of tasks at a site will depend on the conditions at the site.

#### Confirm Tank Design and Piping Configuration and Shutdown Energy Systems

This task focuses on identifying and understanding the location, design and construction of the tank. The scope of this task includes the configuration of the piping systems and the types and power associated with energy systems.

The first step involves obtaining and reviewing a site plan and any drawings or plans that identify the location, history and construction of the tank. Ideally, the site plan will identify the location of both above and below grade pipe and utility lines. The client or other responsible parties will be asked to confirm locations of underground utilities or pipelines.

A visual inspection of the site will be performed. This survey may provide additional information concerning the utilities and systems associated with the tank. Inspecting the area around tank can provide information concerning:

- Contents from posted signs or labels,
- Piping and electrical connections and other appurtenances from the locations of panel boxes and overhead lines, water hydrants and fire suppression systems, etc.
- The locations of vents, discharge lines and filling lines.

The Project Manager will be responsible for ensuring the completion of steps to assess the types and locations of utilities and for maintaining documentation of all surveys and communications. In addition to recording information on drawings and site plans, the location of subsurface utilities will be marked on the ground.

A utility service locator, such as Safe Dig or One Call will be contacted. This action is required by law and not making this contact can have significant legal implications. If necessary the utility service locator will be requested to come to the site.

After the types, locations and magnitudes of utilities and energy systems are identified, the Project Manager, the FSO, and the DEHSM will develop procedures and identify the sequence of steps to ensure the safe shutdown and de-energization of all power to the tank, including electrical and mechanical power. The steps will identify the sources of power or stored energy and the specific actions that will be taken to shutdown each source through lockout/tagout, physically disconnecting the line, and blocking, blinding or draining. Each pipeline connected to the tank shall be disconnected, blanked or locked off and tagged. Electrical disconnections shall be performed by a qualified electrician (See FLD 35, Electrical Safety). Pipeline disconnections may be hazardous due to the contents in the pipe and will be accomplished using appropriate care, including facility or project-specific line breaking procedures.

#### Hazards

The following discussion focuses on the potential hazards to personnel working on-site. However, the implications of improperly identifying and securing utilities extend into the larger community, and include both safety and economic impacts.

- Inhalation exposure to and skin contact with the tank or line contents.
- Ignition of vapors from static charges or other ignition sources.
- Exposure to electrical and other forms of stored energy
- General safety hazards associated with working on an outdoor construction site.

#### Controls

- Level D PPE, modified to include chemically protective gloves when working directly with pipelines and pumping equipment. The type of glove to be worn will depend on the chemical(s) contained in the tank and the piping systems.
- Site-specific procedures will be developed and reviewed to ensure the proper planning and completion of the shutdown tasks, and will address lockout/tagout requirements, the potential for pressure caused by product in lines or closed tanks and inherent vapor pressure of products, and the steps to open lines and covers so a sudden release does not result in splash, vapor release, or propelling of a loosened cap or line into a person's face or body.

- Personnel who are trained and, if necessary, qualified will complete the shutdown and securing of energy systems.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Only qualified electricians may connect or disconnect high voltage electrical power.

#### Tank Emptying

The emptying of a tank will be completed by an experienced person. During the process, steps will be taken to ensure the integrity of equipment and that controls are in-place to minimize the potential for spills and releases to the environment.

The procedures for emptying the tank will be developed prior to the start of the task and will be reviewed with each person working on-site to ensure awareness concerning the task and the contingencies that may be implemented.

The general procedures for emptying the tank involve:

- Using existing lines for removing the liquid.
- Emptying the contents using an explosion proof suction pump connected to existing lines or a gravity drain using the existing line.
- While the discharge line is frequently the best choice, the fill line can be used.
- The line used must draw liquid from or near the bottom of the tank.
- Suction lines and pumps must be electrically bonded to the tank or otherwise grounded to prevent electrostatic ignition hazard.
- The suction equipment must be designed for flammable liquid and must be compatible with the tank contents.
- Using an external liquid removal system which is not part of the tank system.
- If a vacuum truck is used, the area around the truck must be free of flammable vapors and the vacuum pump exhaust gases must be discharged through a hose of adequate size and length downwind of the truck and tank area.
- If the liquid is transferred into drums, the drums will be of an approved type. They will be positioned at all times to minimize the potential for spills and handled using appropriate equipment.
- In order to remove the tank contents, a small amount of water may be added to float tank residues to the level of the discharge line. This will only be performed if the addition of water is compatible with the contents of the tank.
- In order to evaluate if the tank is safe for subsequent operations the tank gases must be examined for flammability using a CGI and O2 Meter.

The specific procedures will depend on the configuration and location of the tank and the requirements for handling the contents of the tank.

The removed materials will be handled and stored at secured locations in accordance with applicable regulations. Any material shipped from the site will be transported by an approved shipper. A copy of all shipping documents will be maintained by the Project Manager.

#### Hazards

- Inhalation exposure to and skin contact with the tank contents.
- Manual material handling associated with the moving of equipment and drums.
- Ignition of vapors from static charges or other ignition sources.
- Flammable vapors and exhaust from the vacuum truck.

#### Controls

- At a minimum, modified Level D PPE, to include chemically protective gloves will be worn by personnel supporting the draining operation. Personnel directly involved in the task, for example connecting or disconnecting lines and working in close proximity to monitor the draining operation, will wear Level C PPE that includes a respiratory protection with an organic vapor canister, a face shield, if a full-face respirator is not worn, and appropriate chemical resistant gloves and clothing.
- Personnel who are trained and, if necessary, qualified will complete the shutdown and securing of energy systems.
- Air monitoring will be performed in the work area using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Air monitoring will be performed of the atmosphere around the tank and tank connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding.
- Eliminate all possible sources of ignition (i.e. pilot lights, non-explosion proof electrical equipment, internal combustion engines from within 25 feet of the tank, pumping system and vacuum exhaust).
- Ensure the pumping system is bonded or grounded, compatible with the tank contents and designed to handle flammable liquid.

#### Accessing the Manway and the Top of the Tank

This task applies to work on a tank located below grade. For aboveground tanks, where access does not require excavating, the sequence of work continues with the "Opening Access Manway" section.

Prior to starting the excavation, the location of the access way will be evaluated to confirm the stability of the area and to plan the task for removing and placing of soil. This planning is critical to avoid subsidence or collapse of the soil or the tank, and to ensure the proper staging of removed soil and debris.

Accessing the tank manway may be completed using hand tools. When the manway is buried under paving or backfill, excavation using powered equipment may be required to remove the cover material. The specific approach to be used will be defined by the conditions at the site.

Based on the contents of the tank, the condition of the tank and the location of the vent pipe, it may be necessary to create an inert atmosphere in the tank prior to accessing the manway. Atmospheric testing will be performed using the CGI/O2 meter and the PID/FID and evaluating the concentrations. If the conditions indicate the need to inert the space, the elements in "Inerting the Tank and Evaluating the Concentrations of Flammables in Tank Exhaust" will be followed.

The soil and overburden removed during the excavation will be stored to control run-off and to facilitate disposal, especially if there is visual or olfactory indications of contamination or the results of testing indicate the presence of contamination in the soil. If possible, the soil will be segregated to separate impacted soil from non-impacted soil. Separating these materials will facilitate handling, reduce the amount of soil for disposal, and identify whether excavated materials can fill the hole after the tank is removed.

#### Hazards

- Heavy equipment hazards from operations and to the operator due to the potential for collapse of the ground as cover is removed to access the tank.
- Power hand tools associated with digging activities.
- Inhalation exposure to and dermal contact with the tank contents.
- Flammable vapors emanating from tank or surrounding soil.
- Underground utilities

#### Controls

- Level D PPE modified to include chemically protective gloves when working directly with pipelines and pumping equipment. The type of glove to be worn will depend on the chemical(s) contained in the tank and the piping systems.
- Follow Heavy Equipment Operation FLD 22.
- Follow Hand and Power Hand Tools FLD 38.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Air monitoring will be performed of the atmosphere around the tank and tank connections, particularly in low areas, with a CGI/O2 meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding.
- Follow Utilities FLD 34.

#### Opening Access Manway

The opening of the manway will be performed using non-sparking tools. The initial opening need only be large enough to permit entering hoses to take CGI/O2 readings. Measurements should be obtained at both high and low points in the vessel and as far laterally in the tank from the opening as possible. The results of the testing will be compared to the identified criteria and to the upper explosive limit (UEL) / LEL values for the tank contents.

After the CGI/O<sub>2</sub> sampling, testing should be performed using the FID and PID to evaluate the concentrations of contaminants with respect to the applicable action limits.

After this initial testing, the tank must be monitored continuously during subsequent operations because additional flammable vapors may be produced when the residues are disturbed or heated. If the results of testing indicate, at any time, the tank needs to be purged, then the manway cover will be replaced and the space purged as described in the "Checking Tank Conditions, Flushing, and Cleaning" section. If atmospheric conditions in the tank are acceptable with respect to the action levels, the bottom residue can be removed using vacuum liquid handling equipment as identified in "Inerting the Tank and Evaluating the Concentrations of Flammables in Tank Exhaust" section.

A tank entry will not be made unless there is no alternative. Entry into the tank will only be made by personnel trained in accordance with the OSHA Permit-Required Confined Space Standard (29 CFR 190.146) and WESTON FLD 08, and when the atmospheric conditions are acceptable: the O<sub>2</sub> level is no lower than 19.5%, the CGI indicates less than 10% of the LEL for the chemical in the tank, and the concentration of the toxic vapors is less than the action limit. A tank will not be entered when the concentration of flammable or combustible vapors is equal to or greater than 10% of the LEL. If the tank must be entered while the tank is oxygen deficient or the concentration of the toxic vapors or gas is equal to or greater than the action limit, the DEHSM's approval is required, to ensure that confined space entrance procedures are in-place and that personnel are trained to use Level B PPE.

If a manway does not exist on the tank, contact the divisional or corporate health and safety department for approval before initiating cold (pneumatic shear) cutting to create an access. Any cutting before an interior inspection of the tank can be performed will be done in accordance with a hot work permit and with divisional and corporate EHS approval.

#### Hazards

- Power and hand tools.
- Inhalation exposure to and skin contact with tank contents and from vapors from tank or surrounding soil.
- Flammable conditions due to tank contents.
- Low oxygen level in tank

#### Controls

- Follow FLD 38 – Hand and Power Hand Tools and use intrinsically safe tools at locations and in operations where flammable gases may be present.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- PPE (Level D) modified as a minimum outside tank, with level B used in the event of entry into the tank, including when only the head is placed inside of the tank to position suction lines.
- Continuously air monitoring the atmosphere around the tank and tank connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10 % will be ventilated to bring the LEL level below 10 % before proceeding.

After residues are removed, CGI/O<sub>2</sub> readings will be taken at, at least, four elevations inside of the tank. The conditions in the tank will be monitored continuously during subsequent operations because additional flammable vapors may be released when residues are disturbed or heated. If at any time the tank needs to be purged, then the manway cover will be replaced and purged as describe under the "Checking Tank Conditions, Flushing, and Cleaning" section. If the atmospheric conditions in the tank meet "SAFE" criteria then ventilate using a blower and monitor continuously to evaluate the LEL and O<sub>2</sub> levels. Blower and blower duct must be grounded and electrically bonded to the tank.

#### Checking Tank Conditions, Flushing, and Cleaning

This task focuses on evaluating the condition of the tank and the procedures to flush and/or clean the tank to remove residual material. The steps in the activity include:

- Opening the tank using a non-sparking tool.
- Obtaining CGI/O<sub>2</sub> readings at both high and low points in the tank and as far laterally from the opening as possible.
- Identifying the type and location of residual materials in the tank.
- Identifying the proper equipment and procedures to remove the residue and attaching and operating the tank flushing/cleaning device in accordance with manufacturer's instructions.

Conditions in and around the tank must be monitored during subsequent operations because additional flammable vapors may be produced when the residues are disturbed or heated.

Whenever possible, vacuuming should be done without entering the tank. High pressure associated with the power washer hazards and the vacuum line suction vacuum line.

#### Hazards

- Inhalation exposure to and skin contact with toxic tank contents
- Ignition of vapors from static charges or other spark source
- Heavy manual labor
- Operating high pressure cleaning systems, including the high pressure lines, moving components on equipment and fuel for the units.
- Use of hand tools.

#### Controls

- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10 % will be ventilated to bring the LEL level below 10 % before proceeding.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.

- Follow Pressure Washers FLD 37.
- Ensure proper storage of flammable liquids on-site

#### Inerting the Tank and Assessing Flammability

The following bullets identify general information concerning liquids identified in this FLD.

- Gasoline is a Class 1B flammable liquid with flash point of -45°F, a boiling point of 102°F and an UEL of 7.6% and an LEL of 1.4%.
- Fuel oils, including kerosene, diesel and fuel Oils 2 - 6 are classified as combustible liquids because their flash points ranging from 100 to 270°F. Kerosene has an UEL of 5% and an LEL of 0.7%.

Atmospheric testing will be performed to ensure that the tank is safe for subsequent operations by assessing flammability using a CGI and O2 Meter. If flammable vapors are present then the tank must be purged or inerted before proceeding.

The following discusses two approaches to inerting the space. Independent of the method used, general procedures involve:

- Ensuring all pipelines and other openings, including the manway, are plugged or closed except for the fill line and the vent line. This step controls the potential exit points for flammable gases and avoids "short circuiting" of the inert gas flow.
- Introducing an inert gas or dry ice through the fill pipe (or other appropriate tank opening). The desired location for adding inert gas is at the end of the tank opposite the vent line, with the inert gas released near the bottom of the tank. When an inert gas is added from a cylinder, the flow will be controlled using a pressure reducer valve connected to a gauge and the pressure will be kept at 5 PSI or less.
- The inert gas supply line will be grounded to the fill line.
- Ideally the vent line will be high enough or located to dilute and disperse the gases exiting the tank away from work areas and other receptors. If the vent line is not suitably located, then the area down wind should be marked to prevent entry by unauthorized personnel. Another option involves extending the height of the stack.
- If a ladder is needed to access the vent line, follow FLD 25 Working at Elevation/Fall Protection and FLD 26 Ladders.
- Test the gases exhausting from the vent pipe using a CGI/O2 meter. The CGI/O2 meter readings will be taken after inert gas has flowed into the tank for at least 10 minutes. Readings should be taken at various locations and levels inside the tank and at the vent point.
- CO2 fire extinguishers will not be used as a source of inert gas because the pressure is too high and the flow from the unit can produce static charges which are potential sources of ignition.

When inerting a tank using dry ice (frozen carbon dioxide [CO2]), 1.75 pounds of dry ice will be needed for every 100 gallons of tank capacity. The dry ice will be distributed evenly on the bottom of the tank. After placing of the dry ice, the tank must remain undisturbed for at least three hours until at least 80% of the dry ice has vaporized and the oxygen concentration is less than 8% before excavation work begins.

During tank inerting and subsequent removal from the ground, the conditions inside tank may change due to differences in temperature and movement below grade and in the air. Tank temperatures may change dramatically as a result of exposure to sunlight or even ambient air temperatures. As the temperature rises and the tank is moved, flammable gases may be released from the contaminants not yet cleaned from the tank surfaces, crevasses and scale.

The tank will be inerted when the concentration of O<sub>2</sub> < 8% or less than 50% of the minimum oxygen concentrations required to support combustion, whichever is less. CGI/O<sub>2</sub> readings at four elevations in the tank, minimum, and at an appropriate distance laterally from the opening as possible will be obtained to confirm the conditions in the tank.

#### Hazards

- The presence of unexpected waste materials, such as waste solvents or gasoline, in the tank without the knowledge of the owner. These vapors can be an unexpected source of flammable or toxic vapors and exhausted during purging.
- Inhalation exposure to gasoline and other vapors released and exhausted during purging.
- Toxic and flammable vapors emanating from tank or surrounding soil.
- Static charges resulting from the flow of gases creating sparks, a source of ignition.
- Falls from ladders.
- Hazards presented by the inert environment and chemicals used to inert the space.
- Material handling and heavy equipment hazards.

#### Controls

- Level D modified PPE at a minimum, including chemical protective gloves during tasks that present potential contact with tank contents, with changes to PPE based on the site conditions.
- Level B PPE will be used in the event that personnel must enter the tank interior. Prior to an entry, the procedures will be reviewed and approved by the DEHSM before being implemented.
- Confirming the tank configuration, including the locations where the inerting material will be added and where it will vent, and ensuring that vapors/gases will be safely vented during the task.
- Extending the height of the vent pipe, if necessary, so the vent line outlet is 12 feet above the grade and 3 feet above an adjacent roof.
- Eliminate sources of ignition from within at least 25 feet of the work area and vent exhaust.
- Electrically bonding the inert gas supply line to the tank fill line and grounding the gas supply.
- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding. Frequent checks of the O<sub>2</sub> calibration on the CGI/O<sub>2</sub> meter will be performed because the O<sub>2</sub> meter sensor is more rapidly worn out when exposed to carbon dioxide.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.

- Follow Ladders FLD 26.
- Inerting will be performed by an experienced person and in accordance with the procedures provided by the equipment manufacturer or provider.
- Follow Heavy Equipment Operation FLD 22.
- Tank gases will be exhausted only through the vent pipe and after ensuring there are no sources of ignition within 25 feet of the tank or the vent pipe outlet.
- Place caution tape barrier or other appropriate barricades around excavation.
- Follow Utilities FLD 34.

#### Excavation and Removal of the Tank

After initial cleaning and flushing of the tank, the soil surrounding the tank can contain flammable and toxic materials. A tank which apparently last contained fuel oil may have previously contained gasoline or other toxic or flammable materials, and these materials may have leaked or spilled during tank filling operations. Gasoline can remain in subsoils for years. As a result, the removal of soil around a tank and the removal of the tank may expose soils contaminated with organic liquids that require it to be sampled and remediated.

The process to access a tank and to remove a tank requires the operation of heavy earth moving equipment to remove soil and heavy lifting equipment to move the tank. This equipment presents a hazard to personnel as they move and operate on the site and as an ignition source. The soils surrounding the tank may contain flammable materials. Low areas are of particular concern because of the potential for vapors to collect at these locations. When LEL readings exceed 20% in open areas, operations are to cease until the flammable vapors can be controlled.

Both the CGI and the PID/FID will be used to monitor the excavated soils. The CGI/O<sub>2</sub> results will be evaluated to ensure the concentrations of vapors/gases are less than 10% of the LEL and the PID/FID results will be evaluated with respect to the action levels. CGI/O<sub>2</sub> readings above 10% of the LEL will require cessation of work until these vapors can be controlled.

The tank will be kept in an upright position during handling and storage to avoid displacing the CO<sub>2</sub>. Before any subsequent work is done on the tank, the atmospheric conditions will be rechecked. The tank will be stabilized and secured when placed to prevent damage and movement. All potentially contaminated soils will be segregated and stockpiled in an appropriate manner, tested and properly disposed.

#### Hazards

- Heavy equipment hazards associated with soil excavation and rigging and lifting of the tank.
- Inhalation exposure to vapors emanating from tank or surrounding soil or skin contact with exposed liquid.
- Open excavation presenting a subsidence hazard and elevations presenting fall hazards.
- Underground utilities

### Controls

- Modified Level D PPE, as a minimum, upgrade if necessary.
- Follow Heavy Equipment Operation FLD 22.
- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O2 meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding. Frequent checks of the O2 calibration on the CGI/O2 meter will be performed because the O2 meter sensor is more rapidly worn out when exposed to carbon dioxide.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Place caution tape barrier or other appropriate barricades around excavation and follow the OSHA Standard for Excavations (29 CFR 1926; Subpart P; Excavation) and WESTON FLD 28, Excavating/Trenching.
- Follow Utilities FLD 34.

### Cutting Access Ports

Prior to cutting openings in the tank before final cleaning, atmospheric testing will be conducted to confirm that the internal atmosphere in the tank is at or below 10% of the LEL, either through purging or venting. If purging or venting can not maintain an atmosphere that is at or below 10% of the LEL, the tank shall be inerted.

If the cutting will involve the use of other tools or torches, then the DEHSM will approve the operation. Prior to cutting the oxygen content shall be at or below 23.5% and the LEL in the tank shall be 0%. During the course of the hot work, if the LEL rises to 10%, then all work will stop and will not continue until the LEL is again 0%.

Once conditions are acceptable, holes (at least 3 by 5 feet in size) will be cut in the ends of the tank using a pneumatic shear. In any cutting operation, the plate being removed shall be supported to prevent it from falling into the tank. The tank surface area near the cut must be kept cool during the cutting with a flow of water.

Once holes are cut in the tank, the interior of the tank will be ventilated using a blower. The blower and blower duct will be grounded and electrically bonded to the tank and will be intrinsically safe.

As indicated, intrinsically safe equipment will be used.

The tank will be monitored continuously during the blowing task and subsequent operations because flammable vapors may be released when residues in the tank are disturbed or heated. If at any time the LEL reading exceeds 10%, ventilate the tank until the LEL drops below 10%.

The area where air exhausts from the tank will be identified and posted to avoid entry by unauthorized personnel. Testing will be performed using the PID/FID to ensure that concentrations of toxics are maintained at a concentration less than one-half of the action level.

### Hazards

- Confined Space Hazards, including flammable and explosion hazards, and inert environments.
- Power and manual hand tools.
- Inhalation exposure and potential dermal contact with tank contents.
- Flammable vapors emanating from tank or surrounding soil.

### Controls

- Follow Confined Space Entry Program FLD 8.
- Follow Pressure Washers FLD 37.
- Follow Hand and Power Hand Tools FLD 38.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O2 meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding. Frequent checks of the O2 calibration on the CGI/O2 meter will be performed because the O2 meter sensor is more rapidly worn out when exposed to carbon dioxide.
- Eliminate sources of ignition from at least 25 feet of the work area.

### Tank Final Cleaning and Cut-up for Disposal

Before disposal the tank must undergo a final cleaning inside and out, and cut up to ensure the tank will not be used again and/or facilitate transportation to disposal location. If the final cleaning involves entering the tank, the confined space entry will be completed in accordance the OSHA Standard (29 CFR 1910.146). When the CGI/O2 indicates the reading is less than 10% of the LEL and the oxygen reading is >19.5 and < 22%, the tank may be entered for final cleaning using Level B PPE. The OSHA and Weston confined space entrance procedures will be followed during this work and approval for the work will be obtained from the DEHSM. An O2 source will never be used to raise the O2 level in the tank, only clean air will be used.

To clean the tank, holes can be cut in the ends of the tank to facilitate the tank cleaning activity and to minimize the difficulty of personnel getting into or out of the tank. A pneumatic shear or reciprocating saw will be used to cut these holes but hot work operating procedures will be followed and the interior of the tank ventilated with a blower and monitored with a CGI to ensure the absence of flammable vapors during this work.

The cleaning of interior tank interior surfaces will be completed using manual scraping, pressure washing, vacuum liquid handling equipment, manual wiping, or combination thereof. Removed tank contents (liquids, sludges) if not contained within the vacuum truck, will be placed in appropriate drums or containers and properly labeled. Any used PPE and wipe-down rags and absorbent pads will be handled in a similar manner.

After the tank has been cleaned, it may be cut up for disposal using shears, saws or cutting torch. The hot work operating practice will be followed during tank cutting including saw cutting. A tank out of the

ground will be subject to higher temperatures and additional vapors may be released from crevasses and recesses which may not be entirely cleaned. To ensure safety, continuous CGI/O2 monitoring will be performed. When cutting with a torch ensure that the LEL reading inside and out of the tank is less than 2% at all times.

#### Hazards

- Fire and explosion hazard from cutting activity.
- Confined Space entry and conditions in the space
- Noise from cutting
- Heavy equipment hazards associated with demolition and cutting of the tank.
- High pressure associated with the power washer hazards and the vacuum line suction vacuum line, if pressure washing is performed to clean the tank.

#### Controls

- Modified Level D, as a minimum, with upgrades in PPE based on results of air sampling and applicable action levels. Based on the contents of the tanks, for example leaded gasoline or other conditions, changes to the level of PPE may be required.
- Ventilate with blower.
- Follow Confined Space Entry Program FLD 8.
- Follow Occupational Noise and Hearing Conservation Program.
- Follow Heavy Equipment Operation FLD 22.
- Follow Pressure Washers FLD 37
- Vacuum liquid handling equipment must be equipped with a quick vacuum relief valve and this valve must be under the control of the confined space entrance spotter. This quick vacuum relief valve is needed to avoid potential injuries which could occur as a result of personnel being exposed to the powerful suction at the inlet to the vacuum line.
- Eliminate sources of ignition from at least 25 feet of the work area.
- Follow hot work procedures and keep LEL reading below 2% during torch cutting.

#### Soil Sampling

Soil sampling will be performed in accordance with all applicable regulations and guidance to confirm that all contaminated soil has been removed. Soil samples will be obtained from the bottom and sides of the excavation (see separate sampling plan) using a backhoe or other mechanical means. No one will enter the excavated area unless the excavation meets standards for sloping or shoring.

#### Hazards

- Excavation hazards, including subsidence and falls.
- Heavy Equipment hazards.
- Inhalation exposure to and contact with toxic chemicals.
- Equipment used in the collection and handling of soils.

### Controls

- Modified Level D, as a minimum, with upgrades in PPE based on results of air sampling and applicable action levels.
- Follow Excavating/Trenching FLD 28.
- Follow Heavy Equipment Operation FLD 22.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.

### Backfill Excavation with Clean Soil

Backfilling of the excavation will be performed in accordance with all applicable regulations and guidance. Clean soil will be placed into the excavation using earth moving equipment. Where possible, compaction of backfill soil will be done remotely using, for example, the excavator bucket to compress the soil in lifts. Personnel will not enter excavation unless protected from cave-in and other trench hazards.

### Hazards

- Heavy equipment hazard.

### Controls

- Modified Level D PPE.
- Follow Heavy Equipment FLD 22.

## **RST 2 FLD 43A      ANIMALS**

Animals represent hazards because of their poisons or venoms, size and aggressiveness, diseases transmitted, or the insects they may carry.

### **Feral Animals**

Landfills and abandoned buildings often attract stray or abandoned dogs. These animals often become pack-oriented, very aggressive, and represent serious risk of harm to unprotected workers.

Workers entering abandoned buildings should be alert for such animals and avoid approaching them since this may provoke aggressive behavior. Avoidance and protection protocols include watching for animal dens, using good housekeeping, and using repellents.

### **Dangerous Wild Animals**

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that companies working in these areas carefully plan for wildlife encounters. This FLD outlines actions that, when properly implemented, should provide a high degree of protection for WESTON employees and wildlife.

See Wildlife Hazard Recognition and Protection Procedure (Attached).

### **Venomous Snakes and Lizards**

#### **Venomous Snakes**

Venomous snakes are common around the world. The major variables are the likelihood of encounter and the snake that is likely to be encountered. Encounters with snakes may be caused by moving containers, reaching into holes, or just walking through high grass, swampy areas, or rocks. **Do not attempt to catch any snakes.**

Symptom of venomous snake bites:

- Bloody wound discharge, blurred vision, burning, convulsions, diarrhea, dizziness, excessive sweating, fainting, fang marks in the skin, fever, increased thirst, local tissue death, loss of muscle coordination, nausea and vomiting, numbness and tingling, rapid pulse, severe pain, skin discoloration, swelling at the site of the bite, weakness.

Venom from venomous snakes and lizards can be divided into three types of toxins, however, there are some indications that snake venom may have more than one toxin and characteristics may change as a snake ages. The three types of toxins and their effects are:

**Hemotoxins** destroy blood cells and affect the circulatory system. The site of the bite rapidly becomes swollen, discolored, and painful. This is usually accompanied by swelling, discoloration, and pain progressing toward the heart.

**Neurotoxins** affect the nervous system and symptoms vary from foggy vision, dizziness, and other comparatively mild symptoms to rigid or flaccid paralysis, shortness of breath, weakness or paralysis of the lower limbs, double vision, inability to speak or swallow, drooping eyelids, and involuntary tremors of the facial muscles. Death can occur in as little as ten minutes, usually due to abrupt cessation of respiration.

**Myotoxins** destroy cells and cause muscle necrosis.

In the US, with the exception of the coral snakes which tend to have neuron-toxic venom, most venomous snakes have been categorized as having hemotoxic venom (in some areas Mojave rattlesnakes are found to have neuron-toxic venom). There is some indication that some species of rattlesnakes have both hemotoxic and neuron-toxic venom. It is also reported that venom of younger snakes may be more neuron-toxic.

There are many highly venomous snakes worldwide, some are deadly and most can be deadly without proper care.

### **Geographical Listing of Venomous Snakes**

Following is a list of poisonous snakes by geographic area. This list is extensive but may not be all inclusive. In planning for work around the world, also contact local agencies to determine whether there may be additional venomous snakes or lizards.

#### **North America**

Copperheads (Broad-banded, Northern, Osage, Southern, Trans-Pecos)  
Rattlesnakes Diamondback (eastern and western), Massasauga (eastern and western)  
Cottonmouth or water moccasin (Eastern)

### **Prevention of Bites**

Key factors to working safely in areas where snakes or lizards may be encountered include:

- Be alert
- Use care when reaching into or moving containers
- Use sticks or long-handled tools when reaching where you cannot see
- Be familiar with the habits and habitats of snakes in the vicinity of an incident or site
- In areas or activities where encounters with snakes are likely, wear sturdy leather or rubber work boots and snake chaps
- Do not attempt to catch snakes unless required and qualified

A snake bite warrants medical attention after administration of proper first-aid procedures. It is important to contact local medical facilities to determine where anti-venoms are located.

## **First-Aid**

1. Keep the person calm. Restrict movement, and keep the affected area below heart level to reduce the flow of venom.
2. Remove any rings or constricting items because the affected area may swell. Create a loose splint to help restrict movement of the area.
3. If the area of the bite begins to swell and change color, the snake was probably venomous.
4. Monitor the person's vital signs -- temperature, pulse, rate of breathing, and blood pressure if possible. If there are signs of shock (such as paleness), lay the person flat, raise the feet about a foot, and cover the person with a blanket.
5. Get medical help immediately.
6. Try to photograph or identify the snake. Do not waste time hunting for the snake, and do not risk another bite. Be careful of the head of a dead snake. A snake can actually bite for up to an hour after it is dead (from a reflex).
  - DO NOT allow the person to become over-exerted. If necessary, carry the person to safety.
  - DO NOT apply a tourniquet.
  - DO NOT apply cold compresses to a snake bite.
  - DO NOT cut into a snake bite with a knife or razor.
  - DO NOT try to suction the venom by mouth.
  - DO NOT give stimulants or pain medications unless instructed to do so by a doctor.
  - DO NOT give the person anything by mouth.
  - DO NOT raise the site of the bite above the level of the person's heart
  - Transport the victim to medical attention immediately

## **Animal Borne Diseases**

### **Rabies**

Animal borne diseases include rabies (generally found in dogs, skunks, raccoons, bats, and foxes). Rabies varies from area to area as do the animals most likely to be rabid.

### **Questions and Answers about Rabies**

*Q. What is Rabies and how is it transmitted?*

A. Rabies is a viral infection most often transmitted by bites of animals infected with the virus.

*Q. What animals are most likely to be infected?*

A. Skunks, raccoons, foxes, and bats are wild animals most frequently found to be infected with rabies; however, any warm blooded animal can be infected. Squirrels, groundhogs, horses, cattle, and rabbits have been tested positive for rabies. Dogs and cats are frequently rabies-infected if not immunized.

*Q. How can you tell if an animal is rabies-infected?*

A. Rabies infection is not always apparent. Signs to look for in wild animals are over-aggressiveness or passivity. Spotting animals which are normally nocturnal (active at night) during the day and being able to approach them would be an example of unusual behavior. Finding a bat alive and on the ground is abnormal. The best precaution, however, is to observe wild animals from a safe distance, even if they are injured. Avoid dogs and cats that you do not know.

*Q. What should you do if bitten by an animal you suspect is infected with rabies?*

A. As quickly as possible, wash the bite area with soap and water, then disinfect with 70% alcohol and seek medical attention for follow-up. Try to capture the animal. Avoid being bitten again or contacting the mouth or any saliva of the animal. Keep the animal under surveillance and call the police for assistance to capture it. Have the animal tested.

A dead animal believed to be infected should be preserved and tested for rabies. Health departments are often sources where information can be found regarding testing.

*Q. Is there a cure for rabies?*

A. Rabies is preventable, even after being bitten, if treatment is begun soon enough. Getting prompt medical attention and confirming the rabies infection of an animal are very important. Rabies is not curable once symptoms or signs of rabies appear.

There are vaccines available that should be considered if a work assignment involves trapping animals likely to carry rabies. Medical consultants must be involved in decisions to immunize workers against rabies.

## **Hantavirus**

WESTON employees or contractors/subcontractors conducting field work in areas where there is evidence of a rodent population should be aware of an increased level of concern regarding the transmission of "Hantavirus"-associated diseases. Hantavirus is associated with rodents, especially the deer mouse (*Peromyscus maniculatus*) as a primary reservoir host. Hantavirus has resulted in several deaths in the U.S.

The Hantavirus can be transmitted by infected rodents through their saliva, urine, and feces. Human infection may occur when infected wastes are inhaled as a result of aerosols produced directly from the animals. They also may come from dried materials introduced into broken skin or onto mucous membranes. Infections in humans occur most in adults and are associated with

activities that provide contact with infected rodents in rural/semi-rural areas. Hantavirus begins with one or more flu-like symptoms (i.e., fever, muscle aches, headache, and/or cough) and progresses rapidly to severe lung disease. Early diagnosis and treatment are vital.

## **Prevention**

Personnel involved in work areas where rodents and the presence of the Hantavirus are known or suspected will need to take personal protective measures and to develop an expanded site safety plan.

Field personnel involved in trapping or contacting rodents or their waste products will need to wear respirators with high-efficiency particulate air (HEPA) filters, eye protection, Tyvek coveralls, chemical-resistant gloves, and disposable boot covers. Strict decontamination requirements are needed. Double-bag, label, and specific handling, packaging, shipping, storage, and analytical procedures are required to minimize the risks of exposure from collected mice. More detailed procedures can be obtained from WESTON Corporate Health and Safety.

For employees and facilities in rural/semi-rural areas, the following risk-reduction strategies are appropriate:

- Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.
- Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.
- Cut all grass/underbrush in proximity to buildings.
- Prevent rodents from entering buildings (e.g., use steel wool, screen, etc., to eliminate openings).

## **Plague**

Described under Insects (Fleas)

## **Anthrax**

Anthrax is an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Anthrax most commonly occurs in wild and domestic lower vertebrates (cattle, sheep, goats, and other herbivores), but it can also occur in humans when they are exposed to infected animals or tissue from infected animals.

Anthrax is most common in agricultural regions where it occurs in animals. When anthrax affects humans, it is usually due to an occupational exposure to infected animals or their products. Workers who are exposed to dead animals and animal products from other countries where anthrax is more common may become infected with *B. anthracis* (industrial anthrax). Anthrax in wild livestock has occurred in the U.S.

Anthrax infection can occur in three forms: cutaneous (skin), inhalation, and gastrointestinal. *B. anthracis* spores can live in the soil for many years, and humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from contaminated animal products. Anthrax can also be spread by eating undercooked meat from infected animals. It is rare to find infected animals in the U.S.

**Cutaneous:** Most (about 95%) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather, or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 cm in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20% of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.

**Inhalation:** Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. Inhalation anthrax is usually fatal.

**Intestinal:** The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, and fever are followed by abdominal pain, vomiting of blood, and severe diarrhea. Intestinal anthrax results in death in 25% to 60% of cases.

Anthrax is not known to spread from one person to another person. Communicability is not a concern in managing or visiting patients with inhalation anthrax.

### **Prevention**

In countries where anthrax is common and vaccination levels of animal herds are low, humans should avoid contact with livestock and animal products and avoid eating meat that has not been properly slaughtered and cooked. Also, an anthrax vaccine has been licensed for use in humans. The vaccine is reported to be 93% effective in protecting against anthrax.

Doctors can prescribe effective antibiotics. To be effective, treatment should be initiated early. If left untreated, the disease can be fatal.

Direct person-to-person spread of anthrax is extremely unlikely; however, a patient's clothing and body may be contaminated with anthrax spores. Effective decontamination of people can be accomplished by a thorough wash down with anti-microbe effective soap and water. Waste water should be treated with bleach or other anti-microbial agent. Effective decontamination of articles can be accomplished by boiling contaminated articles in water for 30 minutes or longer and using common disinfectants. Chlorine is effective in destroying spores and vegetative cells on surfaces. Burning the clothing is also effective. After decontamination, there is no need to immunize, treat, or isolate contacts of people ill with anthrax unless they also were also exposed to the same source of infection. Early antibiotic treatment of anthrax is essential—delay seriously lessens chances for survival. Treatment for anthrax infection and other bacterial infections

includes large doses of intravenous and oral antibiotics, such as fluoroquinolones, like ciprofloxacin (cipro), doxycycline, erythromycin, vancomycin, or penicillin. In possible cases of inhalation anthrax exposure to unvaccinated personnel, early antibiotic prophylaxis treatment is crucial to prevent possible death.

No skin, especially if it has any wounds or scratches, should be exposed. Disposable personal protective equipment is preferable, but if not available, decontamination can be achieved by washing any exposed equipment in hot water, bleach and detergent. Disposable personal protective equipment and filters should be burned and buried. The size of *Bacillus anthracis* bacilli ranges from 0.5  $\mu\text{m}$  to 5.0  $\mu\text{m}$ . Anyone working with anthrax in a suspected or confirmed victim should wear respiratory equipment capable of filtering this size of particle or smaller. The U.S. National Institute for Occupational Safety and Health (NIOSH) and Mine Safety and Health Administration (MSHA) approved high efficiency-respirator, such as a half-face disposable respirator with a HEPA filter, is recommended. All possibly contaminated bedding or clothing should be isolated in double plastic bags and treated as possible bio-hazard waste. Dead victims that are opened and not burned provide an ideal source of anthrax spores; the victim should be sealed in an airtight body bag. Cremating victims is the preferred way of handling body disposal. No embalming or autopsy should be attempted without a fully equipped biohazard lab and trained and knowledgeable personnel.

Delays of only a few days may make the disease untreatable and treatment should be started even without symptoms if possible contamination or exposure is suspected. Animals with anthrax often just die without any apparent symptoms. Initial symptoms may resemble a common cold – sore throat, mild fever, muscle aches and malaise. After a few days, the symptoms may progress to severe breathing problems and shock and ultimately death. Death can occur from about two days to a month after exposure with deaths apparently peaking at about 8 days after exposure. ■ Antibiotic-resistant strains of anthrax are known.

Aerial spores can be trapped by a simple HEPA or P100 filter. Inhalation of anthrax spores can be prevented with a full-face mask using appropriate filtration. Unbroken skin can be decontaminated by washing with simple soap and water. All of these procedures do not kill the spores which are very hard to kill and require extensive treatment to eradicate them. Filters, clothes, etc. exposed to possible anthrax contaminated environments should be treated with chemicals or destroyed by fire to minimize the possibility of spreading the contamination.

In recent years there have been many attempts to develop new drugs against anthrax; but the existing supply still works fine if treatment is started soon enough.

Prevention can also be accomplished through early detection. In response to the U.S. Postal Service (USPS) anthrax attacks of October 2001, the USPS has installed BioDetection Systems (BDS) in their large-scale mail cancellation facilities. BDS response plans have been formulated by the USPS in conjunction with local responders including fire, police, hospitals, and public health. Employees of these facilities have been educated about anthrax, response actions and prophylactic medication. Because of the time delay inherent in getting final verification that anthrax has been used, prophylactic antibiotics for possibly exposed personnel should commence as soon as possible.

The ultimate in prevention is vaccination against infection but this has to be done well in advance of exposure.

Anthrax spores can survive for long periods of time in the environment after release. Methods for cleaning anthrax contaminated sites commonly use oxidizing agents such as peroxides, ethylene Oxide, Sandia Foam, chlorine dioxide (used in the Hart Senate office building), and liquid bleach products containing sodium hypochlorite. These agents slowly destroy bacterial spores. A bleach solution for treating hard surfaces has been approved by the EPA and can be prepared by mixing one part bleach (5.25%-6.00%) to one part white vinegar to eight parts water. Bleach and vinegar must not be combined together directly, rather some water must first be added to the bleach (e.g., two cups water to one cup of bleach), then vinegar (e.g., one cup), and then the rest of the water (e.g., six cups). The pH of the solution should be tested with a paper test strip; and treated surfaces must remain in contact with the bleach solution for 60 minutes (repeated applications will be necessary to keep the surfaces wet).

Chlorine dioxide has emerged as the preferred biocide against anthrax-contaminated sites, having been employed in the treatment of numerous government buildings over the past decade. Its chief drawback is the need for *in situ* processes to have the reactant on demand.

To speed the process, trace amounts of a non-toxic catalyst composed of iron and tetro-amido macrocyclic ligands are combined with sodium carbonate and bicarbonate and converted into a spray. The spray formula is applied to an infested area and is followed by another spray containing tertiary-butyl hydroperoxide.

Using the catalyst method, a complete destruction of all anthrax spores takes 30 minutes. A standard catalyst-free spray destroys fewer than half the spores in the same amount of time. They can be heated, exposed to the harshest chemicals, and they do not easily die.

### **Brucellosis**

Brucellosis, also called undulant fever or Malta fever, is a zoonosis (infectious disease transmitted from animals to humans) caused by bacteria of the genus *Brucella*. It is primarily a disease of domestic animals (goats, pigs, cattle, dogs, etc.) and humans and has a worldwide distribution.

Although brucellosis can be found worldwide, it is more common in countries that do not have good standardized and effective public health and domestic animal health programs. Areas currently listed as high risk include the Caribbean.

The disease is transmitted either through contaminated or untreated milk (and its derivatives) or through direct contact with infected animals, which may include dogs, pigs, camels, and ruminants, primarily sheep, goats, cattle, and bison. This also includes contact with their carcasses.

Leftovers from parturition are also extremely rich in highly virulent brucellae. Brucellae, along with leptospira have the unique property of being able to penetrate through intact human skin, so infection by mere hand contact with infectious material is likely to occur.

The disease is now usually associated with the consumption of un-pasteurized milk and soft cheeses made from the milk of infected animals and with occupational exposure of veterinarians and slaughterhouse workers. Some vaccines used in livestock, most notably *B. abortus* strain 19 also cause disease in humans if accidentally injected. Problems with vaccine induced cases in the United States declined after the release of the RB-51 strain developed in the 1990s and the relaxation of laws requiring vaccination of cattle in many states.

The incubation period of brucellosis is, usually, of one to three weeks, but some rare instances may take several months to surface.

Brucellosis induces inconstant fevers, sweating, weakness, anemia, headaches, depression and muscular and bodily pain.

The symptoms are like those associated with many other febrile diseases, but with emphasis on muscular pain and sweating. The duration of the disease can vary from a few weeks to many months or even years. In first stage of the disease, septicaemia occurs and leads to the classic triad of undulant fevers, sweating (often with characteristic smell, likened to wet hay) and migratory arthralgia and myalgia.

### Prevention

The main way of preventing brucellosis is by using fastidious hygiene in producing raw milk products, or by pasteurization of all milk that is to be ingested by human beings, either in its pure form or as a derivate, such as cheese.

Provide protection from skin contact when handling potentially infected animals.

### Q fever

Q fever is caused by infection with *Coxiella burnetii*. This organism is uncommon but may be found in cattle, sheep, goats and other domestic mammals, including cats and dogs. The infection results from inhalation of contaminated particles in the air, and from contact with the vaginal mucus, milk, feces, urine or semen of infected animals. The incubation period is 9-40 days. It is considered possibly the most infectious disease in the world, as a human being can be infected by a single bacterium.

The most common manifestation is flu-like symptoms with abrupt onset of fever, malaise, profuse perspiration, severe headache, myalgia (muscle pain), joint pain, loss of appetite, upper respiratory problems, dry cough, pleuritic pain, chills, confusion and gastro-intestinal symptoms such as nausea, vomiting and diarrhea. The fever lasts approximately 7-14 days.

During the course, the disease can progress to an atypical pneumonia, which can result in a life threatening acute respiratory distress syndrome (ARDS), whereby such symptoms usually occur during the first 4-5 days of infection.

Less often the Q fever causes (granulomatous) hepatitis which becomes symptomatic with malaise, fever, liver enlargement (hepatomegaly), pain in the right upper quadrant of the abdomen and jaundice (icterus).

The chronic form of the Q fever is virtually identical with the inflammation of the inner lining of the heart (endocarditis), which can occur after months or decades following the infection. It is usually deadly if untreated. However, with appropriate treatment this lethality is around 10%.

The common way of infection is inhalation of contaminated dust, contact with contaminated milk, meat, wool and particularly birthing products. Ticks can transfer the pathogenic agent to other animals. Transfer between humans seems extremely rare and has so far been described in very few cases.

### **Prevention**

Q fever is effectively prevented by intradermal vaccination with a vaccine composed of killed *Coxiella burnetii* organisms. Skin and blood tests should be done before vaccination to identify preexisting immunity; the reason is that vaccinating subjects who already have immunity can result in a severe local reaction. After a single dose of vaccine, protective immunity lasts for many years. Revaccination is not generally required. Annual screening is typically recommended.

Wear appropriate PPE when handling potentially infected animals or materials.

### **Leptospirosis**

Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*.

The time between a person's exposure to a contaminated source and becoming sick is 2 days to 4 weeks. Illness usually begins abruptly with fever and other symptoms. Leptospirosis may occur in two phases; after the first phase, with fever, chills, headache, muscle aches, vomiting, or diarrhea, the patient may recover for a time but become ill again. If a second phase occurs, it is more severe; the person may have kidney or liver failure or meningitis. This phase is also called Weil's disease.

The illness lasts from a few days to 3 weeks or longer. Without treatment, recovery may take several months. In rare cases death occurs.

Many of these symptoms can be mistaken for other diseases. Leptospirosis is confirmed by laboratory testing of a blood or urine sample.

*Leptospira* organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals. Humans become infected through contact with water, food, or soil containing waste from these infected animals. This may happen by consuming contaminated food or water or through skin contact, especially with mucosal surfaces, such as the eyes or nose, or with broken skin. The disease is not known to be spread from person to person.

Leptospirosis occurs worldwide but is most common in temperate or tropical climates. It is an occupational hazard for many people who work outdoors or with animals, for example, farmers, sewer workers, veterinarians, fish workers, dairy farmers, or military personnel. It is a recreational hazard for campers or those who participate in outdoor sports in contaminated areas and has been associated with swimming, wading, and whitewater rafting in contaminated lakes and rivers. The incidence is also increasing among urban children.

The risk of acquiring leptospirosis can be greatly reduced by not swimming or wading in water that might be contaminated with animal urine.

Protective clothing or footwear should be worn by those exposed to contaminated water or soil because of their job or recreational activities.

### **Prevention**

Avoid risky foods and drinks.

Buy it bottled or bring it to a rolling boil for 1 minute before drink it. Bottled carbonated water is safer than non-carbonated water.

Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.

Eat foods that have been thoroughly cooked and that are still hot and steaming

Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well. When eating raw fruit or vegetables that can be peeled, peel them yourself. (Wash your hands with soap first.) Do not eat the peelings.

Avoid foods and beverages from street vendors. It is difficult for food to be kept clean on the street, and many travelers get sick from food bought from street vendors.

Leptospirosis is treated with antibiotics, such as doxycycline or penicillin, which should be given early in the course of the disease. Intravenous antibiotics may be required for persons with more severe symptoms. Persons with symptoms suggestive of leptospirosis should contact a health care provider.

## **Ebola**

Ebola is both the common term used to describe a group of viruses belonging to genus Ebolavirus, family Filoviridae, and the common name for the disease which they cause, Ebola hemorrhagic fever. Ebola viruses are morphologically similar to the Marburg virus, also in the family Filoviridae, and share similar disease symptoms. Ebola has caused a number of serious and highly publicized outbreaks since its discovery.

Despite considerable effort by the World Health Organization, no animal reservoir capable of sustaining the virus between outbreaks has been identified. However, it has been hypothesized that the most likely candidate is the fruit bat.

Ebola hemorrhagic fever is potentially lethal and encompasses a range of symptoms including fever, vomiting, diarrhea, generalized pain or malaise, and sometimes internal and external bleeding. Mortality rates are extremely high, with the human case-fatality rate ranging from 50% - 89%, according to viral subtype.<sup>[2]</sup> The cause of death is usually due to hypovolemic shock or organ failure.

Because Ebola is potentially lethal and since no approved vaccine or treatment is available, Ebola is classified as a biosafety level 4 agent, as well as a Category A bioterrorism agent by the Centers for Disease Control and Prevention.

Symptoms are varied and often appear suddenly. Initial symptoms include high fever (at least 38.8°C), severe headache, muscle joint, or abdominal pain, severe weakness and exhaustion, sore throat, nausea, and dizziness. Before an outbreak is suspected, these early symptoms are easily mistaken for malaria, typhoid fever, dysentery, influenza, or various bacterial infections, which are all far more common and less reliably fatal.

Ebola may progress to cause more serious symptoms, such as diarrhea, dark or bloody feces, vomiting blood, red eyes due to distention and hemorrhage of sclerotic arterioles, petechia, maculopapular rash, and purpura. Other secondary symptoms include hypotension (less than 90 mm Hg systolic /60 mm Hg diastolic), hypovolemia, tachycardia, organ damage (especially the kidneys, spleen, and liver) as a result of disseminated systemic necrosis, and proteinuria. The interior bleeding is caused by a chemical reaction between the virus and the platelets which creates a chemical that will cut cell sized holes into the capillary walls.

Among humans, the virus is transmitted by direct contact with infected body fluids, or to a lesser extent, skin or mucus membrane contact. The incubation period can be anywhere from 2 to 21 days, but is generally between 5 and 10 days.

Although airborne transmission between monkeys has been demonstrated by an accidental outbreak in a laboratory located in Virginia, USA, there is very limited evidence for human-to-human airborne transmission in any reported epidemics.

The infection of human cases with Ebola virus has been documented through the handling of infected chimpanzees, and gorillas--both dead and alive.

So far, all epidemics of Ebola have occurred in sub-optimal hospital conditions, where practices of basic hygiene and sanitation are often either luxuries or unknown to caretakers and where disposable needles and autoclaves are unavailable or too expensive. In modern hospitals with disposable needles and knowledge of basic hygiene and barrier nursing techniques, Ebola rarely spreads on such a large scale.

### **Prevention**

Prevention methods include good hygiene in medical settings and awareness of the virus in travel areas. There is no known effective vaccine for humans.

Prevention efforts should concentrate on avoiding contact with host or vector species. Travelers should not visit locations where an outbreak is occurring. Contact with rodents should be avoided. Minimize exposure to arthropod bites by using permethrin-impregnated bed nets and insect repellents.

Strict compliance with infection control precautions (i.e., use of disposable gloves, face shields, and disposable gowns to prevent direct contact with body fluids and splashes to mucous membranes when caring for patients or handling clinical specimens; appropriate use and disposal of sharp instruments; hand washing and use of disinfectants) is recommended to avoid health care-associated infections.

Contact with dead primates should be avoided.

### **Bird and Bat Borne or Enhanced Diseases**

**See also under Molds and Fungus**

### **Histoplasmosis**

Histoplasmosis is a fungal infection which enters the body through the lungs. The infection enters the body through the lungs. The fungus grows as a mold in the soil, and infection results from breathing in airborne particles. Soil contaminated with bird or bat droppings are known to have a higher concentration of histoplasmosis.

There may be a short period of active infection, or it can become chronic and spread throughout the body. Most people who do develop symptoms will have a flu-like syndrome (acute-fever, chills cough, and chest pain; chronic-chest pain, cough with blood, fever, shortness of breath, sweating) and lung complaints related to pneumonia or other lung involvement. Approximately 10% of the population will develop inflammation in response to the initial infection. This can affect the skin, bones or joints, or the lining of the heart (pericardium). These symptoms are not due to fungal infection of those body parts, but due to inflammation.

In a small number of patients, histoplasmosis may become widespread (disseminated) in involve the blood, brain, adrenal glands, or other organs. Very young or old are at a higher risk for

disseminated histoplasmosis. Symptoms include fevers, headache, neck stiffness, mouth sores, skin lesions.

Histoplasmosis may be prevented by reducing dust exposure in areas containing bird or bat droppings. Wear PPE and respirator when working within this environment. Institute work practices and dust control measures, i.e. moist/wet area, that eliminate or reduce dust generation which will reduce risks of infection and subsequent development of disease.

#### Treatment

The main treatment for histoplasmosis is antifungal drugs. Amphotericin B, itraconazole, and ketoconazole are the usual treatments. Long-term treatment with antifungal drugs may be needed.

#### Psittacosis

Psittacosis is a disease caused by a bacteria that is found in bird droppings and other secretions (often carried by pet birds). The bacteria is found worldwide.

Symptoms of psittacosis infection may include a low-grade fever that often becomes worse as the disease progresses, including anorexia, sore throat, light sensitivity, and a severe headache.

Ammonia and sodium hypochlorite based disinfectants are effective disinfectants for Psittacosis.

Where it is necessary to remove bat droppings from buildings prior to renovation or demolition it is prudent to assume infection and use the following precautions:

- Avoid areas that may harbor the bacteria, e.g., accumulations of bird or bat droppings.
- Areas known or suspected of being contaminated by *the organisms causing* Psittacosis such as bird roosts, attics, or even entire buildings that contain accumulations of bat or bird manure, should be posted with signs warning of the health risk. The building or area should be secured
- Before an activity is started that may disturb any material that might be contaminated by Psittacosis, workers should be informed in writing of the personal risk factors that increase an individual's chances of developing these diseases. Such a written communication should include a warning that individuals with weakened immune systems are at the greatest risk of developing severe forms of these diseases become infected. These people should seek advice from their health care provider about whether they should avoid exposure to materials that might be contaminated with these organisms.

The best way to prevent exposure is to avoid situations where material that might be contaminated can become aerosolized and subsequently inhaled. A brief inhalation exposure to

highly contaminated dust may be all that is needed to cause infection and subsequent development of psittacosis. Therefore, work practices and dust control measures that eliminate or reduce dust generation during the removal of bat manure from a building will also reduce risks of infection and subsequent development of disease. For example, instead of shoveling or sweeping dry, dusty material, carefully wetting it with a water spray can reduce the amount of dust aerosolized during an activity. Adding a surfactant or wetting agent to the water might reduce further the amount of aerosolized dust.

Once the material is wetted, it can be collected in double, heavy-duty plastic bags, a 55-gallon drum, or some other secure container for immediate disposal. An alternative method is use of an industrial vacuum cleaner with a high-efficiency filter to *bag* contaminated material. Truck-mounted or trailer-mounted vacuum systems are recommended for buildings with large accumulations of bat or bird manure. These high-volume systems can remove tons of contaminated material in a short period. Using long, large-diameter hoses, such a system can also remove contaminated material located several stories above its waste hopper. This advantage eliminates the risk of dust exposure that can happen when bags tear accidentally or containers break during their transfer to the ground.

The removal of all material that might be contaminated from a building and immediate waste disposal will eliminate any further risk that someone might be exposed to aerosolized spores. Air sampling, surface sampling, or the use of any other method intended to confirm that no infectious agents remain following removal of bat manure is unnecessary in most cases. However, before a removal activity is considered finished, the cleaned area should be inspected visually to ensure that no residual dust or debris remains.

Spraying 1:10 bleach to water mixture on droppings and allowing it to dry is also a recommended practice for the psittacosis organisms.

Because work practices and dust control measures to reduce worker exposures to these organisms have not been fully evaluated, using personal protective equipment is still necessary during some activities. During removal of an accumulation of bat or bird manure from an enclosed area such as an attic, dust control measures should be used, but wearing a NIOSH-approved respirator and other items of personal protective equipment is also recommended to reduce further the risk of exposure to the organisms that cause Psittacosis.

## Treatment

Psittacosis is often hard to diagnoses and while a concern, it does not occur with great frequency. Knowledge of the symptoms and of potential exposure is important when seeking medical follow-up for potential exposure.

There are various medical treatments for psittacosis based on extent of infection. The sooner the disease is diagnosed and treatment is begun the more effective the treatment will be.

## **APPENDIX A**

### **Dangerous Animals - Wildlife Hazard Recognition and Protection**

#### **GENERAL**

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that companies working in these areas carefully plan for wildlife encounters. This procedure outlines actions that when properly implemented should provide a high degree of protection for employees and wildlife.

These procedures apply to employees who prepare Health and Safety Plans or perform fieldwork in environments in which wild animals may be encountered. However, due to the unpredictable nature of wild animals this single document cannot possibly cover all potential risks or protective measures. Therefore, prior to entering remote areas inhabited by dangerous wildlife, contact local wildlife agencies to gather additional information concerning local risks and protective measures.

#### **ATTACHMENTS**

Attachments 1 and 2 outline behavioral characteristics of and outline controls that will minimize human injury, loss of property, and unnecessary destruction of wildlife, while ensuring a safe work environment.

#### **WILDLIFE AVOIDANCE AND BASIC PROTECTIVE MEASURES**

The best protective measure is simply avoidance. Large numbers of humans present deterrence to wild animals; therefore, whenever possible teams in the field should work together in groups of four or more. Whenever practical, fieldwork should be scheduled around the seasonal cycles of wildlife in the area. When wild animal avoidance cannot be achieved through scheduling, personnel involved in field activities in which encounters with wild animals may result, will take the following steps and will be equipped and trained, as set forth below.

#### **CLEAR THE AREA**

Evaluate and control the area before entry by

- Determine areas of recent sightings through local Fish and Game, state troopers, etc.;
- Conduct a site observation from an off-site elevated point, if possible;
- Conduct a controlled walk through in the area by a trained observer;
- Arrange a briefing by a local specialist, e. g., Fish and Game, etc.; and
- Utilizing appropriate noisemakers.

#### **BASIC EQUIPMENT**

Employees entering an environment where encounters with wild animals are possible should be provided, as a minimum:

- Noisemakers, such as air horns, bells, etc.; and
- Bear spray of not less than 16-ounce capacity (with holster), equivalent to capscicum pepper (red pepper extract), which is capable of spraying at least 15 feet. (Notes: Normally cannot be transported in side aircraft passenger compartments and may be

considered a hazardous material, check with airlines and hazardous material shippers for current information).

#### **TRAINING**

Prior to entering and / or working in areas inhabited by dangerous wildlife each employee should receive training as outlined in this procedure. At a minimum, training must include information related to:

- Wildlife present, habitat, behavior patterns, including when wild animals are most active, etc.
- Warning signs, such as tracks, bedding areas, scat, claw marks, offspring, paths, etc.,
- Avoidance measures
- Other hazards, precautions, and protective measures as outlined in the Attachments,
- (At the jobsite) spray demonstration and safety instructions which include location of and persons designated as "bear watch"

An outline of the training content should be reviewed and approved by the Divisional EHS manager and should be documented. A record of the training will be maintained at the job site, filed with the SSHSP and in the employee's training records.

#### **VEHICLE SAFETY**

Use extreme caution, particularly in darkness, when operating vehicles in areas where wild animals may be present. Collisions with large animals have been known to cause significant property damage and personal injuries to vehicle passengers, including fatalities.

## **ATTACHMENT 1**

### **BEAR SAFETY – HAZARD RECOGNITION AND PRECAUTIONS**

On occasion fieldwork may be conducted in a location where bears may be encountered. The following technical information, precautions, and guidelines for operations in which bears could be encountered are based on experience and conditions for field work. Bears are intelligent, wild animals and are potentially dangerous, and would rather be left alone. The more bears are understood the less they will be feared. This attachment is intended to provide information that will enable Weston to plan for bear encounters and to properly address face-to-face encounters.

#### **Bear Life History**

Although bears are creatures of habit, they are also intelligent, and each has its own personality. The way a bear reacts is often dictated by what it has learned from its mother, the experience it has had on its own, and the instincts nature has provided. Like other intelligent animals, we can make general statements about bears, but few people can accurately predict their behavior.

Bears have an incredible sense of smell, and seem to trust it more than any other sense. Hearing and sight are also important, but to a lesser degree. A bear's hearing is probably better than ours, but not as keen as a dog's hearing. Their sight is probably comparable to that of a human. Black bears tend to favor forested habitats.

Bears are opportunists, relying on their intelligence and their senses to find food. They use different habitats throughout the year, depending on the availability of food and other necessities. The area a bear covers in a given year is partially dependent on how far it has to go to satisfy these basic needs. In some areas, individual bears have home ranges of less than a square mile; in other areas ranges can encompass hundreds of square miles. Males usually range over larger areas than females.

In spring, bears begin coming out of hibernation. Males are usually the first bears to emerge, usually in April, and females with new cubs are usually the last, sometimes as late as late June. When bears emerge from their dens, they are lethargic for the first few days, frequently sleeping near their dens and not eating. When they do start eating, they seek carrion (deer, etc.), roots, and emerging vegetation. In coastal areas, beaches become travel corridors as bears seek these foods.

In early summer, bears eat new grasses and forage as they develop in higher elevations. In coastal areas, salmon are the most important food from June through September. This period is one of the few times that bears are found in large groups, and it is the time that most people see bears. Bears often travel, eat, and sleep along streams for weeks at a time.

Other summer foods for bears include grasses and ground squirrels. When bears kill or scavenge large prey, they commonly cover the portions they cannot eat with sticks and duff. A bear may remain near a food cache for days and it will defend it from intruders.

During the late summer and early fall, bears move inland and consume large amounts of blueberries, and other succulent fruits. As the seasons progress towards winter, a bear's diet becomes more varied. This is the time that bears are adding final deposits of fat before their long winter naps.

In October and November, bears move into their denning areas and begin preparing a suitable den. Black bears usually den in holes under large trees or rock outcrops, or in small natural cavities. Dens are just large enough for the bears to squeeze into. Bears rarely eat, drink, urinate, or defecate while they are denning. They sleep deeply, but do not truly hibernate, and they can be awakened by loud noises or disturbances.

Cubs are born in the den, usually in January. Black bear cubs usually stay with their mothers for a year and a half. Black bears are sexually mature at age 2. Mating season is in the spring (May or June) and both species are polygamous (multiple mates). Black bears can live for 25 – 30 years, although most live less than 20 years.

#### **BEAR AND HUMAN INTERACTIONS**

Bears generally prefer to be left alone, but they share their homes with other creatures, including humans, who intrude on virtually every aspect of the bear's life. Bears are normally tolerant of these activities and generally find a secure way to avoid them. Humans can help bears make a graceful retreat and avoid many close encounters by letting them know we are coming. Walking in groups, talking, and wearing noise making devices, such as bear bells, all serve to warn a bear of your approach. When possible, avoid hiking and camping in areas where bears are common, such as bear trails through heavy brush or along salmon streams. Always keep an eye out for bears and bear signs. If you happen upon a dead animal, especially one that is covered with sticks and duff (a bear cache), immediately retreat the way you came, but do not run, and make a detour around the area. If you see a cub up a tree or a small bear walking alone, immediately retreat and detour around the area. Like all young animals, cubs wander away from their mothers, but females are furiously protective when they believe their cubs are threatened. Even if we do everything possible to avoid meeting a bear, sometimes bears come to us.

Bears are both intelligent and opportunistic, and they express these qualities through their curiosity. This curiosity frequently brings them into "human habitat." When this happens, we often feel vulnerable, and the bear is sometimes viewed as a threat or nuisance. In most cases, a curious bear will investigate a "human sign," perhaps test it out (chew on a raft, bite into some cans, etc.), and leave, never to return. If the bear was rewarded during his investigation by finding something to eat, it is hard to stop them from returning once they have had a food-reward. That is why we emphasize the importance of keeping human food and garbage away from bears. When in bear country, always think about the way you store, cook, and dispose of your food. **Never feed bears!** This is both illegal and foolish. Food should be stored in airtight containers, preferably away from living and sleeping areas. Garbage should be thoroughly incinerated as soon as possible. Fish and game should be cleaned well away from camp, and clothing that smells of fish and game should be stored away from sleeping areas. Menstruating women should take extra precautions to keep themselves as clean as possible, and soiled tampons and pads should

be treated as another form of organic garbage. Once a bear has obtained food from people, it may continue to frequent areas occupied by people. If a bear does not find food or garbage after the next few tries, it may give up and move back into a more natural feeding pattern. Occasionally, though, the bear will continue to seek human foods and can become a "problem bear." Some bears become bold enough to raid campsites and break into cabins to search for human food. Shooting bears in the rump with cracker shells, flares, rubber bullets, and birdshot are common methods of "aversive conditioning." These are also very dangerous techniques, because they may seriously injure a bear if not done properly and/or they may cause a bear to attack the shooter.

## **BLACK BEARS**

**Black Bear Identification:** Black bears are the smallest and most abundant of the bear species. They are five to six feet long and stand about two to three feet high at the shoulders. They weigh from 200 to 500 pounds. While they are most commonly black, other color phases include brown (cinnamon), and, rarely, gray (blue), and white. Muzzles are usually brown. Black bears can be distinguished from brown bears by:

- Their head shape (a black bear's nose is straight in profile, a brown bear's is dished);
- Their claws (black bear's claws are curved and smaller, brown bears are relatively straight and longer);
- Their body shape (when standing, a black bear's rump seems to be higher than its shoulders; a brown bear's shoulders are usually higher than its rump); and

**Typical Habitat:** Black bears occupy a wide range of habitats, but seem to be most common in forested areas.

## **AVOIDING BEAR ENCOUNTERS WHEN**

- **The Bear sees you but you do not know the bear is around:** The bear will likely avoid detection people and will simply move away when they sense a human.
- **You see a bear and it does not know you are there:** Move away slowly. Avoid intercepting the bear if it is walking. If possible, detour around the bear. If the bear is close to you, stand where you are or back away slowly. Do not act threateningly toward the bear, it may know you are there but it has chosen to ignore you as long as you are not a threat.
- **You see the bear and the bear sees you:** Do not act threateningly, but let the bear know you are human. Wave your arms slowly, talk in a calm voice, and walk away slowly in a lateral direction, keeping an eye on the bear. Unless you are very close to a car or a building, never run from bears. In a bear's world, when something runs it is an open invitation to chase it. Bears will chase a running object even if they have no previous intention of catching it. Bears can run as fast as a racehorse, so humans have little or no chance of outrunning a bear.
- **You see a bear; the bear sees you and stands on its hind legs:** This means that the bear is seeking more information. Bears stand on their hind legs to get a better look, or smell, at something they are uncertain of. It is your cue to help it figure

out what you are. Help the bear by waving your arms slowly and talking to it. Standing is not a precursor to an attack. Bears do not attack on their hind legs. It is also important to remember that when a bear goes back down on all fours from a standing position, it may come towards you a few steps. This is normal, and probably not an aggressive act.

- The bear sees you, recognizes you as a human, but continues to come towards you slowly: This may mean several things, depending on the bear and the situation. It may mean that the bear does not see you as a threat, and just wants to get by you (especially if the bear is used to humans, as in a National Park); the bear wants to get food from you (if it has gotten food from people before); the bear wants to test your dominance (it views you as another bear); or may be stalking you as food (more common with black bear, but a rare occurrence). In all cases, your reaction should be to back off the trail very slowly, stand abreast if you are in a group, talk loudly, and/or use a noise-making device. If the bear continues to advance, you should stop. At this point, it is important to give the bear the message that if he continues to advance it will cost him. Continue to make loud noises and present a large visual image to the bear (standing abreast, open your coat). In bear language, bears assert themselves by showing their size. If an adult brown bear continues to come at you, climbing 20 feet or higher up a tree may also be an option if one is next to you (remember, never run from bears). Keep in mind, though, black bears can climb trees.
- The bear recognizes you as a human and acts nervous or aggressive: When bears are nervous or stressed they can be extremely dangerous. This is when it is important to try to understand what is going on in the bears mind. Nervous bears growl, woof, make popping sounds with their teeth, rock back and forth on their front legs, and often stand sideways to their opponent. A universal sign of a nervous bear is excessive salivation (sometimes it looks like they have white lips). When a bear shows any of these signs, stand where you are and talk in a calm voice. Do not try to imitate bear sounds, this may only serve to confuse and further agitate the bear. If you are in a group, stand abreast.
- The bear charges: If all other signals fail, a bear will charge. Surprisingly, most bear charges are just another form of their language. The majority of these are "bluff charges," that is; the bear stops before making contact with their opponent. There are many different types of bluff charges ranging from a loping uncertain gait to a full-blown charge. If a bear charges, stand still.
- The bear attacks: When all else fails, a bear may attack. Attacks may be preceded by all of the behaviors previously described or they may be sudden. Seemingly unprovoked attacks are often the result of a bear being surprised (and feeling threatened), a bear defending its food cache, or a female defending her cubs. When a bear attacks, it typically runs with its body low to the ground, legs are stiff, ears are flattened, hair on the nape of the neck is up, and the bear moves in a fast, determined way. Front paws are often used to knock the opponent down and jaws are used to subdue it.

#### **AFTER A BEAR ENCOUNTER**

Black bears have been known to view humans as prey, and if you struggle with the attacking black bear, it will probably go elsewhere for its meal.

- **Bear Sprays:** Are easy to carry and use, little risk of permanent damage to bears and humans, effective in many situations. However, using a spray may change a false charge into a real charge, they are ineffective at ranges greater than 20 feet, ineffective in windy conditions, dangerous if accidentally discharged in a closed area such as an aircraft cockpit.

The most effective tool you have against an attacking bear is your brain. Although bears are intelligent animals, we are smarter and can often think our way out of a bad situation if we try.

## **ATTACHMENT 2**

### **HAZARDS AND PRECAUTIONS – DEER**

The following technical information, precautions, and guidelines for operations in which Deer may be encountered. The more the species are understood, the easier it will be to avoid contact with them thus preventing injury to ourselves and to the animals. All big game species are unpredictable and can be dangerous under certain conditions. This attachment is intended to provide information that will enable Weston to plan for encounters and to properly address face-to-face encounters.

### **WHITE-TAILED DEER**

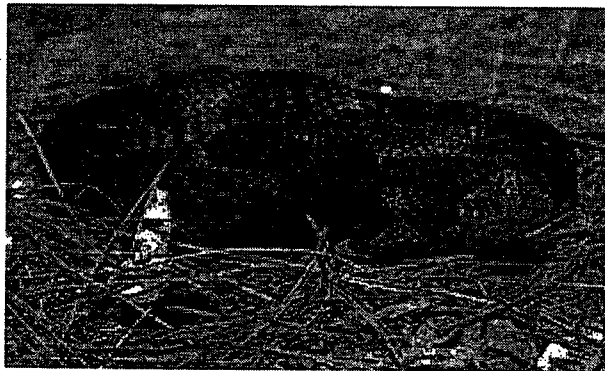
The White-tailed deer found throughout the eastern and western part of the United States have been known to attack people on many occasions. It is unknown whether Black-tailed deer have made any such attacks, but it is possible for someone to be injured by an irate buck in the breeding season (late fall). Deer are well equipped to injure humans. They are very fast. Bucks have sharp antlers and can clear amazingly high obstacles with graceful, arching leaps. They can run with remarkable speed, even in dense cover, and have excellent camouflage. When working in areas populated with deer, it is just common sense not to approach any large wild animal too closely. It is unlikely that an attack from a deer would be fatal but it is possible and serious injury is likely.

## **APPENDIX B - PICTURES OF POISONOUS SNAKES AND LIZARDS**

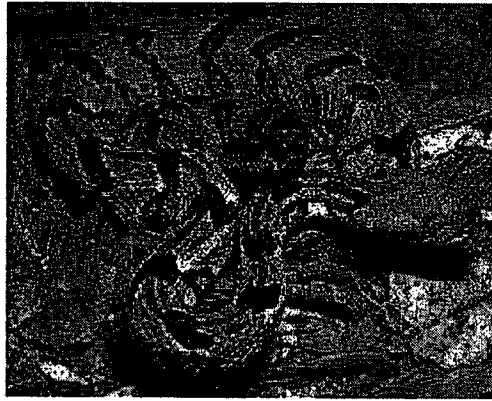
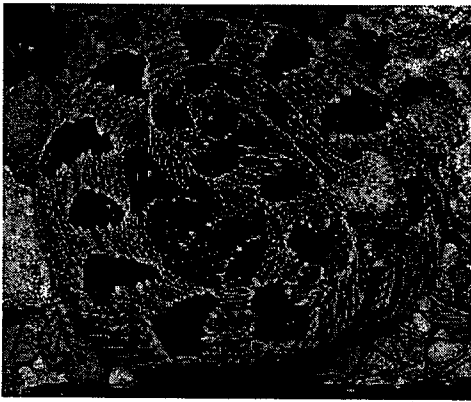
### **Americas**



**American copperhead**



**Cotton Mouth – East and Southeast US**



**Timber Rattlesnake – Eastern US**

Revised March 2011

RST 2 FLD43A - 26

## **FLD 43 B     INSECTS**

### **Sting and Biting Insects**

Contact with stinging insects may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable to being life threatening. Therefore, stinging insects present a serious hazard to site personnel and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. These include the following:

- Bees (Honeybees, bumble bees, wasps, and hornets and wingless wasps)
- Scorpions
- Fire ants
- Spiders
- Ticks
- Deer Flies
- Mosquito
- Fleas
- Bed Bugs

### **Bees, Wasps, Hornets and Yellow Jackets**

The severity of an insect sting reaction varies from person to person. A normal reaction will result in pain, swelling and redness confined to the sting site. Simply disinfect the area (washing with soap and water will do) and apply ice to reduce the swelling.

A large local reaction will result in swelling that extends beyond the sting site. For example, a sting on the forearm could result in the entire arm swelling twice its normal size.

Although alarming in appearance, this condition is often treated the same as a normal reaction. An unusually painful or very large local reaction may need medical attention. Because this condition may persist for two to three days, antihistamines and corticosteroids are sometimes prescribed to lessen the discomfort.

Yellow jackets, hornets and wasps can sting repeatedly. Honeybees have barbed stingers that are left behind in their victim's skin. These stingers are best removed by a scraping action, rather than a pulling motion, which may actually squeeze more venom into the skin.

### **Scorpions (Caribbean)**

Scorpion stings are a major public health problem in many underdeveloped tropical countries. For every person killed by a poisonous snake, 10 are killed by a poisonous scorpion. In the United States, only 4 deaths in 11 years have occurred as a result of scorpion stings. Furthermore, scorpions can be found outside their normal range of distribution, ie, when they

accidentally crawl into luggage, boxes, containers, or shoes and are unwittingly transported home via human travelers.

Out of 1,500 scorpion species, 50 are dangerous to humans. Scorpion stings cause a wide range of conditions, from severe local skin reactions to neurologic, respiratory, and cardiovascular collapse.

Almost all of these lethal scorpions belong to the scorpion family called the Buthidae. The Buthidae are small to mid-size scorpions (0.8 inch to 5.0 inches) and normally uniformly colored without patterns or shapes. Poisonous scorpions also tend to have weak-looking pincers, thin bodies, and thick tails, as opposed to the strong heavy pincers, thick bodies, and thin tails seen in nonlethal scorpions. The lethal members of the Buthidae family include the genera of *Tityus* which can be found in the Caribbean.

A scorpion has a flattened elongated body and can easily hide in cracks. Scorpions are members of the Arachnid (spider) family. The bodies consist of 3-segments, they also have 4 pairs of legs, a pair of claws, and a segmented tail that has a poisonous spike at the end. Scorpions vary in size from 1-20 cm in length.

However, scorpions may be found outside their habitat range of distribution when inadvertently transported with luggage and cargo.

### **Prevention**

Preventive measures include awareness of scorpions, shaking out clothing and boots before putting them on looking before reaching into likely hiding places and wearing gloves, long sleeved shirts and pants.

### **Symptoms**

In mild cases, the only symptom may be a mild tingling or burning at site of sting.

In severe cases, symptoms may include:

- Eyes and ears - Double vision
- Lungs - Difficulty breathing, No breathing, Rapid breathing,
- Nose, mouth, and throat – Drooling, Spasm of the voice box, Thick-feeling tongue
- Heart and blood - High blood pressure, Increased or decreased heart rate, Irregular heartbeat
- Kidneys and bladder Urinary incontinence, Urine output, decreased
- Muscles and joints - Muscle spasms
- Nervous system – Paralysis, Random movements of head, eye, or neck, Restlessness, Seizures, Stiffness
- Stomach and intestinal tract - Abdominal cramps, Fecal incontinence
- Other -Convulsions

## **Treatment**

1. Recognize scorpion sting symptoms:
2. Wash the area with soap and water.
3. Apply a cool compress on the area of the scorpion sting. Ice (wrapped in a washcloth or other suitable covering) may be applied to the sting location for 10 minutes. Remove compress for 10 minutes and repeat as necessary.
4. Call the Poison Control Center. If you develop symptoms of a poisonous scorpion sting, go to the nearest emergency care facility.
5. Keep your tetanus shots and boosters current.

## **Fire Ants (Caribbean)**

Fire ants are aggressive, reddish-brown to black ants that are 1/8 inch to 1/4 inch long. They construct nests, which are often visible as dome-shaped mounds of soil, sometimes as large as 3 feet across and 1 1/2 feet in height. In sandy soils, mounds are flatter and less visible. Fire ants usually build mounds in sunny, open areas such as lawns, pastures, cultivated fields and meadows, but they are not restricted to these areas. Mounds or nests may be located in rotting logs, around trees and stumps, under pavement and buildings, and occasionally indoors.

Fire ants use their stingers to immobilize or kill prey and to defend ant mounds from disturbance by larger animals, such as humans. Any disturbance sends hundreds of workers out to attack anything that moves. The ant grabs its victim with its mandibles (mouthparts) and then inserts its stinger. The process of stinging releases a chemical, which alerts other ants, inducing them to sting. In addition, one ant can sting several times without letting go with its mandibles.

Once stung, humans experience a sharp pain that lasts a couple of minutes, then after a while the sting starts itching and a welt appears. Fire ant venom contains alkaloids and a relatively small amount of protein. The alkaloids kill skin cells; this attracts white blood cells, which form a pustule within a few hours of being stung. The fluid in the pustule is sterile, but if the pustule is broken, the wound may become infected. The protein in the venom can cause allergic reactions that may require medical attention.

Some of the factors related to stinging insects that increase the risk associated with accidental contact are:

- The nests for these insects are frequently found in remote wooded or grassy areas and hidden in cavities
- The nests can be situated in trees, rocks, bushes or in the ground, and are usually difficult to see
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention

- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages
- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure, therefore, even if someone has been stung previously, and not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again

With these things in mind, and with the high probability of contact with stinging insects, use the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp or hornet stings, inform the site Safety officer of this condition prior to participation in site activities
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the Site Safety officer if a stinging insect nest is located or suspected in the area
- Any nests located on site will be flagged off and site personnel will be notified of its presence
- If attacked, site personnel will immediately seek shelter and stay there. Do not jump in water (bees will still be in the area when you come up). Once safe, remove stings from your skin, it does not matter how you do it, but do it as quickly as possible to reduce the amount of venom they inject. Obtain first aid treatment and contact the safety officer who will observe for signs of allergic reaction

Treatment for fire ant stings is aimed at preventing secondary bacterial infection, which may occur if the pustule is scratched or broken. Clean the blisters with soap and water to prevent secondary infection. Do not break the blister. Topical corticosteroid ointments and oral antihistamines may relieve the itching associated with these reactions.

Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times

## **Spiders**

A large variety of spiders may be encountered during site activities. Extreme caution must be used when lifting logs and debris, since spiders are typically found in these areas.

While most spider bites merely cause localized pain, swelling, reddening, and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological affects caused by their venom, are dangerous.

**Black Widow:** The black widow is a coal-black bulbous spider 3/4 to 1 1/2 inches in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

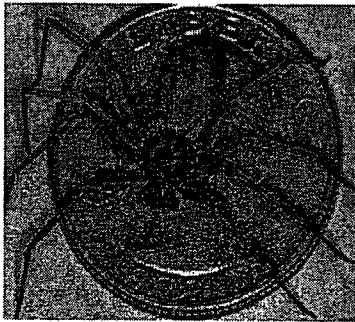
- Sensation of pinprick or minor burning at the time of the bite
- Appearance of small punctures (but sometimes none are visible)
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities

**Brown Recluse:** The brown or violin spider is brownish to tan in color, rather flat, and 1/2 to 5/8 inches long. However, unlike the typical species, this spider has been encountered without a violin or "fiddle" shaped mark on the top of the head. Of the brown spider, there are three varieties found in the United States that present a problem to site personnel. These are the brown recluse, the desert violin and the Arizona violin. These spiders may be found in a variety of locations including trees, rocks or in dark locations. Victims of a brown or violin spider bite may exhibit the following signs or symptoms:

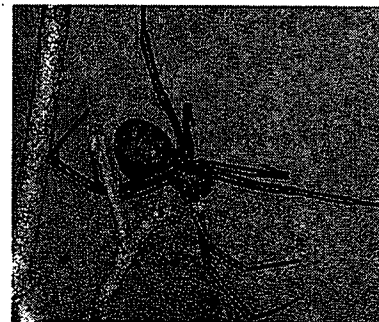
- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite
- Formation of a large, red, swollen, postulating lesion with a bull's-eye appearance
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting
- Pain may become severe after 8 hours, with the onset of tissue necrosis

There is no effective first aid treatment for either of these bites. Except for very young, very old or weak victims, spider bites are not considered to be life threatening. However, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.

#### **Brown Recluse Spider**



#### **Black Widow Spider**



First aid should include:

- If possible, catch the spider to confirm its identity. Even if the body is crushed, save it for identification
- Clean the bitten area with soap and water or rubbing alcohol
- To relieve pain, place an ice pack over the bite
- Keep the victim quiet and monitor breathing

Seek immediate medical attention

### **Sensitivity Reaction to Insect Stings or Bites**

A sensitivity reaction is one of the more dangerous and acute effects of insect bites or stings. It is the most common cause of fatalities from bites, particularly from bees, wasps, and spiders. Anaphylactic shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous system. This can also result in death.

Site personnel must be questioned regarding their allergic reaction to insect bites. Anyone knowingly allergic should be required to carry and know how to use a response kit (e.g., Epi-Kit). First aid providers must be instructed on how to use the kit also. The kit must be inspected to ensure it is updated.

Administer first aid and observe persons reporting stings for signs of allergic reaction, such as unusual swelling, nausea, dizziness, and shock. At the first sign of these symptoms, take the individual to a medical facility for attention.

### **Insect Borne Diseases**

Diseases that are spread by insects include the following: Lyme Disease (tick); Bubonic and other forms of Plague (fleas); Malaria, West Nile Virus and Equine Encephalitis (mosquito).

### **Tick Borne Diseases**

Lyme disease is the second most rapidly spreading disease in the U.S.

### **Lyme Disease**

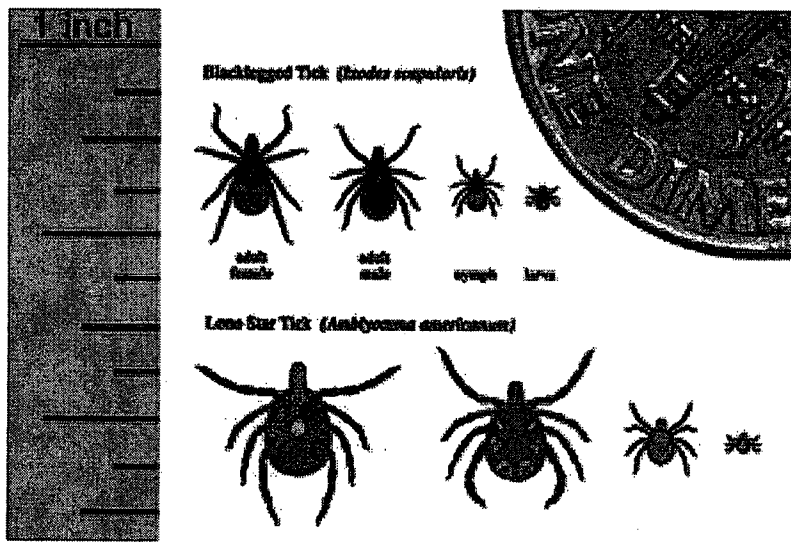
#### **1. Facts**

#### **Definition:**

- Bacterial infection transmitted by the bite of an infected black-legged tick more popularly known as the deer tick.
- Prevalence (nationwide and other countries).
- Three stages/sizes of deer ticks:
  - Larvae
  - Nymph
  - Adult

Tick season is May through October.

Not all ticks transmit Lyme disease (Black legged or deer tick [upper] compared to the Lone Star tick [lower])



- Ticks must be attached for several hours before Lyme disease can be transmitted.
- Being bitten by a tick does not mean you will get Lyme disease.

## 2. Prevention and Protection:

- Wear light-colored, tight-knit clothing.
- Wear long pants and long-sleeved shirts.
- Tuck pant legs into shoes or boots.
- Wear a hat.
- Use insect repellent containing DEET ((follow manufacturer's instructions for use).
- Check yourself daily for ticks after being in grassy, wooded areas.
- Request information from the Health and Safety Medical Section regarding Lyme Disease.

## 3. If Bitten:

- Remove the tick immediately with fine-tipped tweezers. Grasp the tick as close to the skin as possible. Pull gently but firmly without twisting or crushing the tick.
- Wash your hands and dab the bite with an antiseptic.

- Save the tick in a jar in some alcohol. Label the jar with the date of the bite, the area where you picked up the tick and the spot on your body where you were bitten.
- Monitor the bite for any signs of infection or rash.

#### 4. Symptoms:

Early Signs (may vary from person to person)

- Expanding skin rash.
- Flu-like symptoms during summer or early fall that include the following:
  - Chills, fever, headache, swollen lymph nodes.
  - Stiff neck, aching joints, and muscles.
  - Fatigue.
- Later signs
  - Nervous system problems.
  - Heart problems.
  - Arthritis, especially in knees.

#### 5. Upon Onset of Symptoms:

- Notify your Safety Officer (SO) and your supervisor.

### **Ehrlichiosis**

Ehrlichiosis is the general name used to describe several bacterial diseases that affect animals and humans. These diseases are caused by the organisms in the genus *Ehrlichia*. Worldwide, there are currently four ehrlichial species that are known to cause disease in humans.

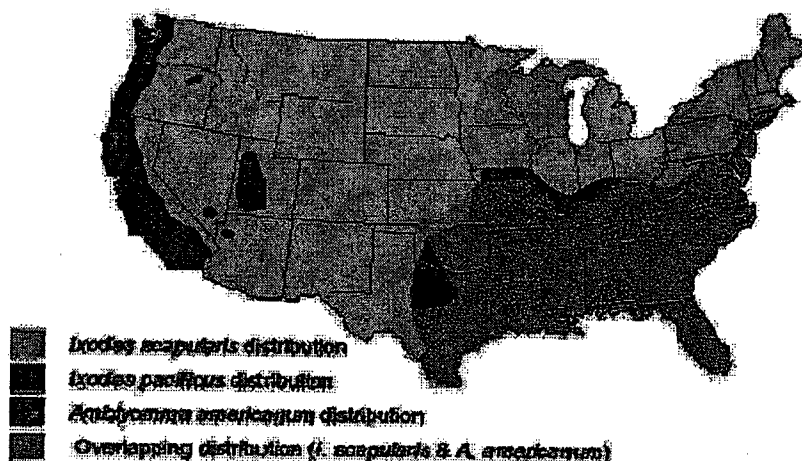
In the United States, ehrlichiae are transmitted by the bite of an infected tick. The lone star tick (*Amblyomma americanum*) and the blacklegged tick (*Ixodes scapularis*) are known vectors of ehrlichiosis.

The symptoms of ehrlichiosis may resemble symptoms of various other infectious and non-infectious diseases. These clinical features generally include fever, headache, fatigue, and muscle aches. Other signs and symptoms may include nausea, vomiting, diarrhea, cough, joint pains, confusion, and occasionally rash. Symptoms typically appear after an incubation period of 5-10 days following the tick bite. It is possible that many individuals who become infected with ehrlichiae do not become ill or they develop only very mild symptoms.

Most cases of ehrlichiosis are reported within the geographic distribution of the vector ticks (see map below). Occasionally, cases are reported from areas outside the distribution of the tick vector. In most instances, these cases have involved persons who traveled to areas where the diseases are endemic, and who had been bitten by an infected tick and developed symptoms after

returning home. Therefore, if you traveled to an ehrlichiosis-endemic area 2 weeks prior to becoming ill, you should tell your doctor where you traveled.

**Figure 20. Areas where human ehrlichiosis may occur based on approximate distribution of vector tick species**



A diagnosis of ehrlichiosis is based on a combination of clinical signs and symptoms and confirmatory laboratory tests. Blood samples can be sent to a reference laboratory for testing. However, the availability of the different types of laboratory tests varies considerably. Other laboratory findings indicative of ehrlichiosis include low white blood cell count, low platelet count, and elevated liver enzymes.

Ehrlichiosis is treated with a tetracycline antibiotic, usually doxycycline.

Very little is known about immunity to ehrlichial infections. Although it has been proposed that infection with ehrlichiae confers long-term protection against reinfection, there have been occasional reports of laboratory-confirmed reinfection. Short-term protection has been described in animals infected with some *Ehrlichia* species and this protection wanes after about 1 year. Clearly, more studies are needed to determine the extent and duration of protection against reinfection in humans.

Limiting exposure to ticks reduces the likelihood of infection in persons exposed to tick-infested habitats. Prompt careful inspection of your body and removal of crawling or attached ticks is an important method of preventing disease. It may take 24–48 hours of attachment before microorganisms are transmitted from the tick to you.

#### **Preventive measures - Follow protection protocols for Lyme disease**

#### **Babesiosis**

Babesiosis is an intraerythrocytic parasitic infection caused by protozoa of the genus *Babesia* and transmitted through the bite of the *Ixodes* tick, the same vector responsible for transmission of Lyme disease. While most cases are tick-borne, transfusion and transplacental transmission

have been reported. In the United States, babesiosis is usually an asymptomatic infection in healthy individuals. Several groups of patients become symptomatic, and, within these subpopulations, significant morbidity and mortality occur. The disease most severely affects patients who are elderly, immunocompromised, or asplenic. Among those symptomatically infected, the mortality rate is 10% in the United States.

The primary vectors of the parasite are ticks of the genus *Ixodes*. In the United States, the black-legged tick, *Ixodes scapularis* (also known as *Ixodes dammini*) is the primary vector for the parasite. The *Ixodes* tick vector for *Babesia* is the same vector that locally transmits *Borrelia burgdorferi*, the agent implicated in Lyme disease. The primary US animal reservoir is the white-footed mouse, *Peromyscus leucopus*. Additionally, white-tailed deer serve as transport hosts for the adult tick vector, *I. scapularis*.

The Ixodid ticks ingest *Babesia* during feeding from the host, multiply the protozoa in their gut wall, and concentrate it in their salivary glands. The tick inoculates a new host when feeding again. The parasite then infects red blood cells (RBCs) and differentiated and undifferentiated trophozoites are produced. The former produce 2-4 merozoites that disrupt the RBC and go on to invade other RBCs. This leads to hemolytic anemia, thrombocytopenia, and atypical lymphocyte formation. Alterations in RBC membranes cause decreased conformability and increased red cell adherence, which can lead to development of acute respiratory distress syndrome (ARDS) among those severely affected.

The signs and symptoms mimic malaria and range in severity from asymptomatic to septic shock.

Symptoms include: Generalized weakness, fatigue, depression, fever, anorexia and weight loss, CNS - Headache, photophobia, neck stiffness, altered sensorium, pulmonary - Cough, shortness of breath, GI - Nausea, vomiting, abdominal pain, Musculoskeletal - Arthralgia and myalgia and Renal - Dark urine

### **Prevention**

Prevention measures are the same as for Lyme and other insect borne diseases

### **Tularemia**

**Tularemia** (also known as "rabbit fever") is a serious infectious disease caused by the bacterium *Francisella tularensis*. The disease is endemic in North America. The primary vectors are ticks and deer flies, but the disease can also be spread through other arthropods. Animals such as rabbits, prairie dogs, hares and muskrats serve as reservoir hosts.

Depending on the site of infection, tularemia has six characteristic clinical syndromes: ulceroglandular, glandular, oropharyngeal, pneumonic, oculoglandular, and typhoidal.

The disease has a very rapid onset, with headache, fatigue, dizziness, muscle pains, loss of appetite and nausea. Face and eyes redden and become inflamed. Inflammation spreads to the

lymph nodes, which enlarge and may suppurate (mimicking bubonic plague). Lymph node involvement is accompanied by a high fever. Death may result.

*Francisella tularensis* is one of the most infective bacteria known; fewer than ten organisms can cause disease leading to severe illness. The bacteria penetrate into the body through damaged skin and mucous membranes, or through inhalation. Humans are most often infected by tick bite or through handling an infected animal. Ingesting infected water, soil, or food can also cause infection. Tularemia can also be acquired by inhalation; hunters are at a higher risk for this disease because of the potential of inhaling the bacteria during the skinning process. Tularemia is not spread directly from person to person.

No vaccine is available to the general public. The best way to prevent tularemia infection is to wear rubber gloves when handling or skinning rodents or lagomorphs (as rabbits), avoid ingesting uncooked wild game and untreated water sources, and wearing long-sleeved clothes and using an insect repellent to prevent tick bites.

#### **Prevention**

No vaccine is available to the general public. The best way to prevent tularemia infection is to wear rubber gloves when handling or skinning rodents or lagomorphs (as rabbits), avoid ingesting uncooked wild game and untreated water sources, and wearing long-sleeved clothes and using an insect repellent to prevent tick bites.

**Other diseases primarily transmitted by Arthropods (Ticks, mites, lice etc.)**

**Typhus** (Not to be confused with Typhoid Fever [discussed in these FLDs])

*For the unrelated disease caused by *Salmonella typhi*, see Typhoid fever. For the unrelated disease caused by *Salmonella paratyphi*, please refer to Paratyphoid fever. For the monster of Greek mythology, see Typhus (monster).*

**Typhus** is any one of several similar diseases caused by louse-borne bacteria. The name comes from the Greek *typhos*, meaning smoky or lazy, describing the state of mind of those affected with typhus. *Rickettsia* is endemic in rodent hosts, including mice and rats, and spreads to humans through mites, fleas and body lice. The arthropod vector flourishes under conditions of poor hygiene, such as those found in prisons or refugee camps, amongst the homeless, or until the middle of the 20th century, in armies in the field. In tropical countries, typhus is often mistaken for dengue fever.

#### **Endemic typhu**

Endemic typhus (also called "flea-borne typhus" and "murine typhus" or "rat flea typhus") is caused by the bacteria *Rickettsia typhi*, and is transmitted by the flea that infest rats. Symptoms of endemic typhus include headache, fever, chills, myalgia, nausea, vomiting, and cough.

Endemic typhus is highly treatable with antibiotics. Most people recover fully, but death may occur in the elderly, severely disabled or patients with a depressed immune system.

## **Encephalitis Arboviral Encephalitides**

### **Perspectives**

Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, psychodids, ceratopogonids, and ticks). Vertebrate infection occurs when the infected arthropod takes a blood meal. The term 'arbovirus' has no taxonomic significance. Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus *Alphavirus*, *Flaviviridae*, and *Bunyaviridae*).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

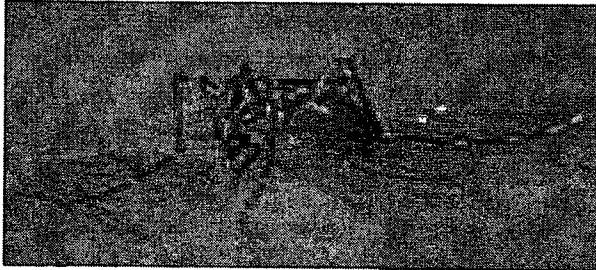
Arboviral encephalitides have a global distribution, but there are four main virus agents of encephalitis in the United States, all of which are transmitted by mosquitoes. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

**There is expanded discussion of several of these diseases (West Nile and Eastern Equine Encephalitis elsewhere in this document. A more general discussion is found in Attachment 2.**

## Mosquito Borne Diseases

### Malaria

**Malaria** is a mosquito-borne disease caused by a parasite. Four kinds of malaria parasites can infect humans: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*.



People with malaria often experience fever, chills, and flu-like illness. Left untreated, they may develop severe complications and die. Each year 350-500 million cases of malaria occur worldwide. Infection with any of the malaria species can make a person feel very ill; infection with *P. falciparum*, if not promptly treated, may be fatal. Although malaria can be a fatal disease, illness and death from malaria are largely preventable.

This sometimes fatal disease can be prevented and cured. Bed nets, insecticides, and anti-malarial drugs are effective tools to fight malaria in areas where it is transmitted. Travelers to a malaria-risk area should avoid mosquito bites and take a preventive anti-malarial drug. Malaria was eradicated from the United States in the early 1950s. However, malaria is common in many developing countries and travelers who visit these areas risk getting malaria.

Returning travelers and arriving immigrants could also reintroduce the disease in the United States if they are infected with malaria when they return. The mosquito that transmits malaria, *Anopheles*, is found throughout much of the United States. If local mosquitoes bite an infected person, those mosquitoes can, in turn, infect local residents (*introduced malaria*).

Because the malaria parasite is found in red blood cells, malaria can also be transmitted through blood transfusion, organ transplant, or the shared use of needles or syringes contaminated with blood. Malaria may also be transmitted from a mother to her fetus before or during delivery ("congenital" malaria).

Malaria is not transmitted from person to person like a cold or the flu. You cannot get malaria from casual contact with malaria-infected people.

## **Prevention and control**

You can prevent malaria by:

- keeping mosquitoes from biting you, especially at night
- taking anti-malarial drugs to kill the parasites
- eliminating places where mosquitoes breed
- spraying insecticides on walls to kill adult mosquitoes that come inside
- sleeping under bed nets - especially effective if they have been treated with insecticide,
- wearing insect repellent and long-sleeved clothing if out of doors at night

The surest way for you and your health-care provider to know whether you have malaria is to have a diagnostic test where a drop of your blood is examined under the microscope for the presence of malaria parasites. If you are sick and there is any suspicion of malaria (for example, if you have recently traveled in a malaria-risk area) the test should be performed without delay.

The disease should be treated early in its course, before it becomes severe and poses a risk to the patient's life. Several good anti-malarial drugs are available, and should be administered early on. The most important step is to think about malaria, so that the disease is diagnosed and treated in time.

## **West Nile Virus**

West Nile virus (WNV) is a potentially serious illness. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. This fact sheet contains important information that can help you recognize and prevent WNV.

The easiest and best way to avoid WNV is to prevent mosquito bites.

- When you are outdoors, use insect repellent containing an EPA-registered active ingredient. Follow the directions on the package.
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.
- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from buckets, barrels and drainage ditches.

About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

Up to 20 percent of the people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks.

Approximately 80 percent of people (about 4 out of 5) who are infected with WNV will not show any symptoms at all. Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.

In a very small number of cases, WNV also has been spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby.

WNV is not spread through casual contact such as touching or kissing a person with the virus.

Symptoms typically develop between 3 - 14 days after being bitten by an infected mosquito.

There is no specific treatment for WNV infection. In cases with milder symptoms, people experience symptoms such as fever and aches that pass on their own, although even healthy people have become sick for several weeks. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

Milder WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection though they may choose to do so. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately. Severe WNV illness usually requires hospitalization. Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms that could be WNV. People over the age of 50 are more likely to develop serious symptoms of WNV if they do get sick and should take special care to avoid mosquito bites.

The more time you're outdoors, the more time you could be bitten by an infected mosquito. Pay attention to avoiding mosquito bites if you spend a lot of time outside, either working or playing.

All donated blood is checked for WNV before being used. The risk of getting WNV through blood transfusions and organ transplants is very small, and should not prevent people who need surgery from having it. If you have concerns, talk to your doctor.

### **Equine Encephalitis**

Eastern equine encephalitis (EEE) is a mosquito-borne viral disease. EEE virus (EEEV) occurs in the eastern half of the United States where it causes disease in humans, horses, and some bird species. Because of the high mortality rate, EEE is regarded as one of the most serious mosquito-borne diseases in the United States.

EEEV is transmitted to humans through the bite of an infected mosquito. It generally takes from 3 to 10 days to develop symptoms of EEE after being bitten by an infected mosquito. The main EEEV transmission cycle is between birds and mosquitoes.

Many species of mosquitoes can become infected with EEEV. The most important mosquito species in maintaining the bird-mosquito transmission cycle is *Culiseta melanura*, which reproduces in freshwater hardwood swamps. *Culiseta melanura*, however, is not considered to be an important vector of EEEV to horses or humans because it feeds almost exclusively on birds.

Transmission to horses or humans requires mosquito species capable of creating a "bridge" between infected birds and uninfected mammals such as some *Aedes*, *Coquillettidia*, and *Culex* species.

Horses are susceptible to EEE and some cases are fatal. EEEV infections in horses, however, are not a significant risk factor for human infection because horses are considered to be "dead-end" hosts for the virus (i.e., the amount of EEEV in their bloodstreams is usually insufficient to infect mosquitoes).

Eastern equine encephalitis virus is a member of the family Togaviridae, genus *Alphavirus* closely related to Western equine encephalitis virus and Venezuelan equine encephalitis virus

Many persons infected with EEEV have no apparent illness. In those persons who do develop illness, symptoms range from mild flu-like illness to inflammation of the brain, coma and death.

The mortality rate from EEE is approximately one-third, making it one of the most deadly mosquito-borne diseases in the United States.

There is no specific treatment for EEE; optimal medical care includes hospitalization and supportive care (for example, expert nursing care, respiratory support, prevention of secondary bacterial infections, and physical therapy, depending on the situation).

Approximately half of those persons who survive EEE will have mild to severe permanent neurologic damage.

Incidence rate includes:

- Approximately 220 confirmed cases in the US 1964-2004, Average of 5 cases/year, with a range from 0-15 cases
- States with largest number of cases includes New Jersey.
- EEEV transmission is most common in and around freshwater hardwood swamps in the Atlantic Coast states and the Great Lakes region.

- Human cases occur relatively infrequently, largely because the primary transmission cycle takes place in and around swampy areas where human populations tend to be limited.

#### **Risk Groups:**

- Residents of and visitors to endemic areas (areas with an established presence of the virus)
- People who engage in outdoor work and recreational activities in endemic areas.
- Persons over age 50 and younger than age 15 seem to be at greatest risk for developing severe EEE when infected with the virus.

#### **Prevention**

- A vaccine is available to protect equines.
- People should avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active (some bridge vectors of EEEV are aggressive day-biters), and removing standing water that can provide mosquito breeding sites.
- There are laboratory tests to diagnosis EEEV infection including serology, especially IgM testing of serum and cerebrospinal fluid (CSF), and neutralizing antibody testing of acute- and convalescent-phase serum.

#### **Meningitis**

Meningitis is a viral disease that can affect the central nervous system that is transmitted through the bite from an infected mosquito.

Symptoms can be nonexistent or severe and flu-like, with fever, chills, tiredness, headache, nausea and vomiting. If not treated promptly the disease can be fatal.

#### **Prevention**

- A vaccine is available. It's 80% effective after a single dose and 97.5% effective after a second dose.

Use precautions as for other mosquito borne diseases. Avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active and removing standing water that can provide mosquito breeding sites.

#### **Deer Flies (See Tularemia above)**

## **Fleas**

Flea is a common name for insects of the order Siphonaptera which are wingless insects with mouthparts adapted for piercing skin and sucking blood. Fleas are external parasites, living by hematophagy off the blood of mammals (including humans). Some species include the cat flea (*Ctenocephalides felis*), dog flea (*Ctenocephalides canis*), and human flea (*Pulex irritans*).

Fleas are small (1.5 to 3.3 mm) long, agile, dark-colored, wingless insect with tube-like mouth parts adapted to feeding on the blood of their hosts. Their legs are long, with the hind pair well adapted for jumping. A flea can jump vertically up to seven inches and horizontally up to 13 inches. The flea body is hard, polished, and covered with many hairs and short spines directed backwards which assists its movement on the host. The body is able to withstand great pressure. Hard squeezing between the fingers is not normally sufficient to kill a flea.

Fleas lay tiny white oval-shaped eggs. The larva is small, pale, has bristles covering its worm-like body, lacks eyes, and has mouthparts adapted to chewing.

Fleas can cause medical problems include flea allergy dermatitis, secondary skin irritations and, in extreme cases, anemia, tapeworms, and stomach flu. Fleas can transmit murine typhus (endemic typhus) fever among animals and from animal to humans. Fleas can also transmit bubonic plague. Tapeworms normally infest in human severe cases. Although the bite is rarely felt, it is the resulting irritation caused by the flea salivary secretions that varies among individuals. Some result in a severe reaction including a general rash or inflammation resulting in secondary infections caused by scratching the irritated skin. Most bites are found on the feet and legs with the formation of small, hard, red, slightly raised itching spots with a single puncture point in the center of each spot.

### **Treatment**

Flea bites can be treated with anti-itch creams, usually antihistamines or hydrocortisone.

## **Bed Bugs**

Bed bugs are small parasitic insects that feed on human blood. A number of health effects may occur due to bed bugs including skin rashes, prominent blisters, psychological effects and allergic symptoms. Diagnosis involves finding the bed bugs and the occurrence of compatible symptoms. Treatment is otherwise symptomatic.

Adult bed bugs are reddish-brown, flattened, oval and wingless. Bed bugs have microscopic hairs that give them a banded appearance. Adults grow to 4-5mm in length and 1.5-3 mm wide. A bed bug pierces the skin of its host with two hollow feeding tubes shaped like tongues. The one tube injects its saliva, which contains anticoagulants and anesthetics, while the other draws blood of its host. After feeding for approximately five minutes, the bug returns to its hiding place. Although bed bugs can live for a year without feeding, they normally feed every five to ten days.

Eradication of bed bugs frequently requires a combination of pesticide and non-pesticide approaches. Pyrethroids, dichlorvos, and malathion have historically been effective. Mechanical approaches include vacuuming and heat treating or wrapping mattresses have also been recommended.

**ATTACHMENT 1**  
**RICKETTSIAL INFECTIONS**

## **Rickettsial Infections**

### **Description**

Many species of *Rickettsia* can cause illnesses in humans (Table below). The term “rickettsiae” conventionally embraces a polyphyletic group of microorganisms in the class Proteobacteria, comprising species belonging to the genera *Rickettsia*, *Ehrlichia*, *Coxiella*, and *Bartonella*. These agents are usually not transmissible directly from person to person except by blood transfusion or organ transplantation, although sexual and placental transmission has been proposed for *Coxiella*. Transmission generally occurs via an infected arthropod vector or through exposure to an infected animal reservoir host. However, sennetsu fever is acquired following consumption of raw fish products. The clinical severity and duration of illnesses associated with different rickettsial infections vary considerably, even within a given antigenic group. Rickettsioses range in severity from diseases that are usually relatively mild (cat scratch disease) to those that can be life-threatening (murine typhus) and they vary in duration from those that can be self-limiting to chronic (Q fever and bartonellosis) or recrudescent (Brill-Zinsser disease). Most patients with rickettsial infections recover with timely use of appropriate antibiotic therapy.

Travelers may be at risk for exposure to agents of rickettsial diseases if they engage in occupational or recreational activities which bring them into contact with habitats that support the vectors or animal reservoir species associated with these pathogens.

The geographic distribution and the risks for exposure to rickettsial agents are described below and in the Table below.

### **Trench Fever**

Trench fever, which is caused by *Bartonella quintana*, is transmitted from one person to another by the human body louse. Contemporary outbreaks of both diseases are rare in most developed countries and generally occur only in communities and populations in which body louse infestations are frequent, especially during the colder months when louse-infested clothing is not laundered. Foci of trench fever have also been recognized among homeless populations in urban centers of industrialized countries. Travelers who are not at risk of exposure to body lice or to persons with lice are unlikely to acquire these illnesses. However, health-care workers who care for these patients may be at risk for acquiring louse-borne illnesses through inhalation or inoculation of infectious louse feces into the skin or conjunctiva.

## Murine Typhus

Murine typhus, which is caused by infection with *Rickettsia typhi*, is transmitted to humans by rat fleas, particularly during exposure in rat-infested buildings (3). Flea-infested rats can be found throughout the year in humid tropical environments, especially in harbor or riverine environments. In temperate regions, they are most common during the warm summer months.

Travelers who participate in outdoor activities in grassy or wooded areas (e.g., trekking, camping, or going on safari) may be at risk for acquiring tick-borne illnesses, including those caused by *Rickettsia*, and *Ehrlichia* species (see below).

**TABLE Epidemiologic features and symptoms of rickettsial diseases**

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Typhus fevers	Murine typhus	<i>R. typhi</i>	As above, generally less severe	Rat flea	Rats, mice	Worldwide
Spotted fevers						
Coxiella	Q fever	<i>Coxiella burnetii</i>	Fever, headache, chills, sweating, pneumonia, hepatitis, endocarditis	Most human infections are acquired by inhalation of infectious aerosols; tick	Goats, sheep, cattle, domestic cats, other	Worldwide
Bartonella	Cat-scratch disease	<i>Bartonella henselae</i>	Fever, adenopathy, neuroretinitis, encephalitis	Cat flea	Domestic cats	Worldwide
	Trench fever	<i>B. quintana</i>	Fever, headache, pain in shins, splenomegaly, disseminated rash	Human body louse	Humans	Worldwide
Ehrlichia	Ehrlichiosis	<i>Ehrlichia chaffeensis</i> <sup>#</sup>	Fever, headache, nausea, occasionally rash	Tick	Various large and small mammals, including deer and rodents	Worldwide

This represents only a partial list of symptoms. Patients may have different symptoms or only a few of those listed.

## Anaplasmosis and Ehrlichiosis

Human ehrlichiosis and anaplasmosis are acute tick-borne diseases, associated with the lone star tick, *Amblyomma americanum*, and *Ixodes* ticks, respectively. Because one tick may be infected with more than one tick-borne pathogen (e.g. *Borrelia burgdorferi*, the causative agent of Lyme disease, or various *Babesia* species, agent of human babesiosis), patients may be present with

atypical clinical symptoms that complicate treatment. Ehrlichioses and anaplasmosis are characterized by infection of different types of leukocytes, where the causative agent multiplies in cytoplasmic membrane-bound vacuole called morulae. Morulae can sometimes be detected in Giemsa-stained blood smears.

## **Q FEVER**

Q fever occurs worldwide, most often in persons who have contact with infected goat, sheep, cat and cattle, particularly parturient animals (especially farmers, veterinarians, butchers, meat packers, and seasonal workers). Travelers who visit farms or rural communities can be exposed to *Coxiella burnetii*, the agent of Q fever, through airborne transmission (via animal-contaminated soil and dust) or less commonly through consumption of unpasteurized milk products or by exposure to infected ticks. These infections may initially result in only mild and self-limiting influenza-like illnesses, but if untreated, infections may become chronic, particularly in persons with preexisting heart valve abnormalities or with prosthetic valves. Such persons can develop chronic and potentially fatal endocarditis.

## **Cat-Scratch Disease**

Cat-scratch disease is contracted through scratches and bites from domestic cats, particularly kittens, infected with *Bartonella henselae*, and possibly from their fleas (3, 4). Exposure can therefore occur wherever cats are found.

## **Symptoms**

Clinical presentations of rickettsial illnesses vary (Table above), but common early symptoms, including fever, headache, and malaise, are generally nonspecific. Illnesses resulting from infection with rickettsial agents may go unrecognized or are attributed to other causes. Atypical presentations are common and may be expected with poorly characterized non-indigenous agents, so appropriate samples for examination by specialized reference laboratories should be obtained. A diagnosis of rickettsial diseases is based on two or more of the following: 1) clinical symptoms and an epidemiologic history compatible with a rickettsial disease, 2) the development of specific convalescent-phase antibodies reactive with a given pathogen or antigenic group, 3) a positive polymerase chain reaction test result, 4) specific immunohistologic detection of rickettsial agent, or 5) isolation of a rickettsial agent. Ascertaining the likely place and the nature of potential exposures is particularly helpful for accurate diagnostic testing.

## **Prevention**

With the exception of the louse-borne diseases described above, for which contact with infectious arthropod feces is the primary mode of transmission (through autoinoculation into a wound, conjunctiva, or inhalation), travelers and health-care providers are generally not at risk for becoming infected via exposure to an ill person. Limiting exposures to vectors or animal reservoirs remains the best means for reducing the risk for disease. Travelers and persons working in areas where organisms may be present should implement prevention based on avoidance of vector-infested habitats, use of repellents and protective clothing, prompt detection and removal of arthropods from clothing and skin, and attention to hygiene.

Q fever and *Bartonella* group diseases may pose a special risk for persons with abnormal or prosthetic heart valves, and *Rickettsia*, *Ehrlichia*, and *Bartonella* for persons who are immunocompromised.

## **ATTACHMENT 2**

### **ENCEPHALITIS ARBOVIRAL ENCEPHALITIDES**

## Encephalitis Arboviral Encephalitides

### Perspectives

Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, psychodids, ceratopogonids, and ticks). Vertebrate infection occurs when the infected arthropod takes a blood meal. The term 'arbovirus' has no taxonomic significance. Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus *Alphavirus*, *Flaviviridae*, and *Bunyaviridae*).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

Arboviral encephalitides have a global distribution which is transmitted by mosquitoes. Powassan, is a minor cause of encephalitis in the northern United States, and is transmitted by ticks. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

The majority of human infections is asymptomatic or may result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, myalgias, malaise and occasionally prostration. Infection may, however, lead to encephalitis, with a fatal outcome or permanent neurologic sequelae. Fortunately, only a small proportion of infected persons progress to frank encephalitis.

Experimental studies have shown that invasion of the central nervous system (CNS), generally follows initial virus replication in various peripheral sites and a period of viremia. Viral transfer from the blood to the CNS through the olfactory tract has been suggested. Because the arboviral encephalitides are viral diseases, antibiotics are not effective for treatment and no effective antiviral drugs have yet been discovered.

## **Prevention**

Arboviral encephalitis can be prevented in two major ways: personal protective measures and public health measures to reduce the population of infected mosquitoes. Personal measures include reducing time outdoors particularly in early evening hours, wearing long pants and long sleeved shirts and applying mosquito repellent to exposed skin areas. Public health measures often require spraying of insecticides to kill juvenile (larvae) and adult mosquitoes.

Selection of mosquito control methods depends on what needs to be achieved; but, in most emergency situations, the preferred method to achieve maximum results over a wide area is aerial spraying. In many states aerial spraying may be available in certain locations as a means to control nuisance mosquitoes. Such resources can be redirected to areas of virus activity. When aerial spraying is not routinely used, such services are usually contracted for a given time period. Financing of aerial spraying costs during large outbreaks is usually provided by state emergency contingency funds. Federal funding of emergency spraying is rare and almost always requires a federal disaster declaration. Such disaster declarations usually occur when the vector-borne disease has the potential to infect large numbers of people, when a large population is at risk and when the area requiring treatment is extensive. Special large planes maintained by the United States Air Force can be called upon to deliver the insecticide(s) chosen for such emergencies. Federal disaster declarations have relied heavily on risk assessment by the CDC.

There are no commercially available human vaccines for these U.S. diseases.

## **Powassan Encephalitis**

Powassan (POW) virus is a flavivirus and currently the only well documented tick-borne transmitted arbovirus occurring in the United States and Canada. Recently a Powassan-like virus was isolated from the deer tick, *Ixodes scapularis*. Its relationship to POW and its ability to cause human disease has not been fully elucidated. POW's range in the United States is primarily in the upper tier States. In addition to isolations from man, the virus has been recovered from ticks (*Ixodes marxi*, *I. cookei* and *Dermacentor andersoni*) and from the tissues of a skunk (*Spilogale putorius*). It is a rare cause of acute viral encephalitis. POW virus was first isolated from the brain of a 5-year-old child who died in Ontario in 1958. Patients who recover may have residual neurological problems.

## **Other Arboviral Encephalitides**

Many other arboviral encephalitides occur throughout the world. Most of these diseases are problems only for those individuals traveling to countries where the viruses are endemic.

## **West Nile Encephalitis**

Discussed elsewhere in this document



## FLD 43 D HAZARDOUS PLANTS

A number of hazardous plants may be encountered during field operations. The ailments associated with these plants range from mild hay fever to contact dermatitis. Plants that present the greatest risk to site workers are those that produce allergic reactions and tissue injury.

### Plants That Cause Skin and Tissue Injury

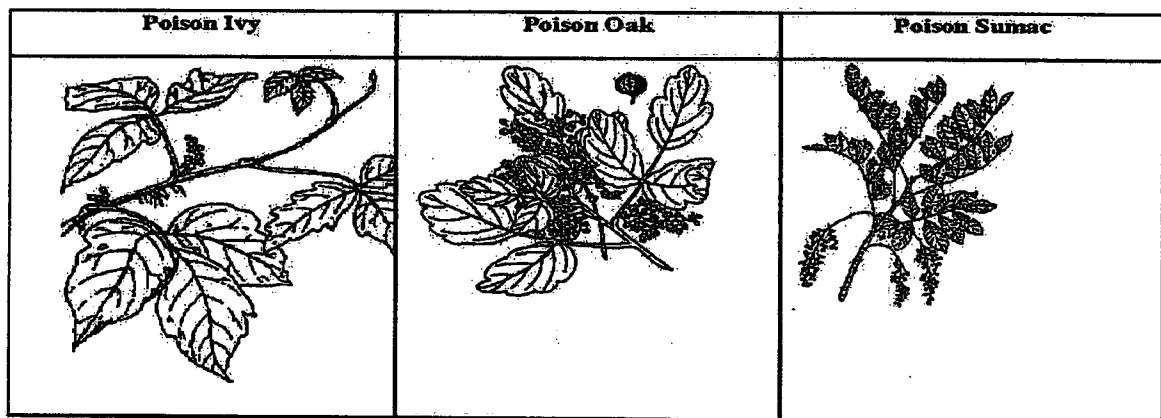
Contact with sharp leaves and thorns are of special concern to site personnel. This concern stems from the fact that punctures, cuts, and even minor scrapes caused by accidental contact may result in skin lesions and the introduction of fungi or bacteria through the skin. This is especially important in light of the fact that the warm moist environment created inside protective clothing is ideal for the propagation of fungal and bacterial infection. Personnel receiving any of the injuries listed above, even minor scrapes shall report immediately for continued observation and care. Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

### Plants That Cause an Allergic Reaction

The poisonous plants of greatest concern are poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Poison sumac is a tall shrub or small tree with 6 to 12 leaflets arranged in pairs with a single leaflet at the end. This plant grows in wooded, swampy areas.

**Poison Ivy/Poison Oak/Poison Sumac**



The reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact
- Reddening, swelling, itching and burning at the site of contact
- Pain, if the reaction is severe
- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin

If the rash is scratched, secondary infections can occur. Preventive measures that are effective for most site personnel include:

- Avoid contact with any poisonous plants on site, and keep a steady watch to identify, report and mark poisonous plants found on site
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment and clothing
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventive solution

Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

### **Plants That are Poisonous**

There are a number of plants worldwide beside poison ivy, oak and sumac which have poisonous properties. In many cases consumption of these plants or parts of these plants can result in poisoning. In other cases, contact with the plants may be poisonous. The following is a listing with pertinent information on poisonous properties and locations of a number of plants.

In general, when working in the outdoors or where you may come in contact with household plants or where your families may come in contact with these plants, it is important that as soon as possible after contact the area or areas should be thoroughly washed and hands must be thoroughly washed before eating drinking, smoking or any other hand to mouth contact.

In keeping with our 24/7 BBS concept, it is important to remember that children are particularly vulnerable to many of the poisonous parts of these plants. Many of these poisonous parts resemble non-poisonous food items such as berries and are attractive.

As with most lists there is extensive information but the list may not include all poisonous plants.

It is important to remember that this document is a starting point to be supplemented with local information. The majority of this information is from a list found in Wikipedia an on line Dictionary readily accessible via Google. The website has pictures of these plants as well as links to other information sources.

## POISONOUS PLANTS

From Wikipedia,

This is a list of plants containing poisonous parts that pose a serious risk of illness, injury, or death to humans.

### Poisonous Food Plants

- **Apple (*Malus domestica*)** Found worldwide in cooler climates. Seeds contain cyanogenic glycosides; although the amount found in most apples won't kill a person.
- **Cherry (*Prunus cerasus*)**, as well as other species (*Prunus spp*) such as peach (*Prunus persica*), plum (*Prunus domestica*), almond (*Prunus dulcis*) and apricot (*Prunus armeninaca*). There are around 430 species of *Prunus*, spread throughout the northern temperate regions of the globe. Leaves and seeds contain cyanogenic glycosides
- **Rhubarb (*Rheum rhaponticum*)** Found worldwide. Leaves, but not stems, contain oxalic acid salts, causing kidney disorders, convulsions, and coma. Rarely fatal.
- **Tomato (*Solanum lycopersicum*)** Found worldwide. Foliage and vines contain alkaloid poisons which cause digestive upset and nervous excitement.

### Other Poisonous Plants

- **Autumn crocus.** Found in North America. The bulbs are poisonous and cause nausea, vomiting, diarrhea. Can be fatal.
- **Azalea** Found Worldwide. All parts of the plant are poisonous and cause nausea, vomiting, depression, breathing difficulties, and coma. Rarely fatal.
- **Bittersweet nightshade** Naturalized in North America. All parts are poisonous, containing solanine and causing fatigue, paralysis, convulsions and diarrhea. Rarely fatal.
- **Bleeding heart / Dutchman's breeches.** Found in North America. Leaves and roots are poisonous and cause convulsions and other nervous symptoms.
- **Black locust.** Naturalized in North America. Pods are toxic
- **Caladium / Elephant ear.** Ornamental plants in North America. All parts of the plant are poisonous. Symptoms are generally irritation, pain, and swelling of tissues. If the mouth or tongue swells, breathing may be fatally blocked.

- **Castor Oil Plant (*Ricinus communis*)** Castor Oil Plant. **Found Worldwide.** The phytotoxin is ricin, an extremely toxic water soluble protein, which is concentrated in the seed. Also present are ricinine, an alkaloid, and an irritant oil. Causes burning in mouth and throat, convulsions, and is **often fatal.**
- **Daffodil.** Found worldwide. The bulbs are poisonous and cause nausea, vomiting, and diarrhea. **Can be fatal.**
- **Daphne (*Daphne sp.*)** **Ornamental plant worldwide.** The berries (either red or yellow) are poisonous, causing burns to mouth and digestive tract, followed by coma. **Often fatal.**
- **Darnel/Poison Ryegrass (*Lolium temulentum*)** **Usually grows in the same production zones as wheat and is considered a weed.** The seeds and seed heads of this common garden weed may contain the alkaloids temuline and loline. Some experts also point to the fungus ergot or fungi of the genus endoconidium both of which grow on the seed heads of rye grasses as an additional source of toxicity.
- **Deadly nightshade (*Atropa belladonna*)** **Naturalized in parts of North America.** All parts of the plant contain the toxic alkaloid atropine. The young plants and seeds are especially poisonous, causing nausea, muscle twitches, paralysis; **often fatal.**
- **Dumbcane / dieffenbachia.** **Found in tropical areas and popular as house plants.** All parts are poisonous, causing intense burning, irritation, and immobility of the tongue, mouth, and throat. Swelling can be severe enough to block breathing leading to death.
- **Ivy.** **Native to North America** where winters are not severe. The leaves and berries are poisonous, causing stomach pains, labored breathing, possible coma.
- **Jerusalem cherry United States** All parts, especially the berries, are poisonous, causing nausea and vomiting. **Looks like a cherry tomato.** It is occasionally fatal, especially to children.
- **Lilies Worldwide** There are some 3500 species that comprise the lily (Lilaceae) family. Some are beneficial including (foods such as onion, shallot, garlic, chives [all *Allium* spp] and asparagus) and some with medicinal uses (colchicine and red squill) Many produce alkaloids which are poisonous, especially to cats.
- **Manchineel (*Hippomane mancinella*)** **Native to the Caribbean (including Puerto Rico and the Virgin Islands).** It is one of the most poisonous trees in the world All parts of this tree including the fruit contain toxic phorbol esters typical of the Euphorbiaceae. Sap may cause burning of the skin and smoke from burning may cause eye irritation and blindness. Fruits, which are similar in appearance to an apple, are green or greenish-yellow when ripe.
- **Oak Worldwide** Most species foliage and acorns are mildly poisonous, causing digestive upset, heart trouble, contact dermatitis. **Rarely fatal.**

- **Poison-ivy (*Toxicodendron radicans*), Poison-oak (*T. diversilobum*), and Poison Sumac (*T. vernix*) North America** All parts of these plants contain a highly irritating oil with urushiol (this is actually not a poison but an allergen). Skin reactions can include blisters and rashes. It spreads readily to clothes and back again, and has a very long life. Infections can follow scratching.
- **Pokeweed (*Phytolacca sp.*) Native to North America.** Leaves, berries and roots contain phytolaccatoxin and phytolaccigenin - toxin in young leaves is reduced with each boiling and draining.

## **FLD 52 ASBESTOS EXPOSURE CONTROL PROGRAM**

This Exposure Control Program will be reviewed annually and updated as appropriate to reflect any changes that may impact WESTON's compliance status.

### **RELATED PROGRAMS:**

*Respiratory Protection Program*  
*Occupational Medical Monitoring Program*  
*Personal Protective Equipment Program*

WESTON will ensure that appropriate authorities are notified in accordance with regulations when asbestos work is to be performed and will ensure proper registrations are in place. Independent subcontractors not under WESTON's direct supervision will be solely responsible for notifications to appropriate federal, state, and local authorities.

This Program applies to all WESTON employees and subcontractors who work with asbestos.

### **Permissible Exposure Limits (PELS)**

WESTON will ensure that no employee will be exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter (f/cc) of air as an 8-hour time-weighted average (TWA), as determined by the method prescribed in Appendix A to this Program, or by an equivalent method.

WESTON will ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 1 f/cc of air averaged over a sampling period of 30 minutes, as determined by the method prescribed in Appendix A to this Program, or by an equivalent method.

### **Multi-Employer Worksites**

On multi-employer worksites, when performing work requiring the establishment of a regulated area, WESTON will inform other employers on the site of the nature of WESTON's work with asbestos and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other employers are not exposed to asbestos.

Asbestos hazards at a multi-employer work site will be abated by the contractor who created or controls the source of asbestos contamination. For example, if there is a significant breach of an enclosure containing Class I work, the employer responsible for erecting the enclosure will repair the breach immediately.

In addition, WESTON will comply with all applicable protective provisions of this standard to protect its employees exposed to asbestos hazards. For example, if employees working immediately adjacent to a Class I asbestos job are exposed to asbestos due to the inadequate containment of such job, their employer will either remove the employees from the area until the enclosure breach is repaired; or perform an initial exposure assessment pursuant to 20 CFR 1926.1101(f).

All employers of employees working adjacent to regulated areas established by WESTON on a multi-employer work-site will take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to adjacent areas.

Likewise, on multi-employer sites WESTON will take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to adjacent areas.

WESTON and all general contractors on a construction project which includes work covered by 29 CFR 1926.1101 will be expected to exercise general supervisory authority over the work covered by this standard, even though the general contractor is not qualified to serve as the asbestos "competent person" as defined by paragraph 29 CFR 1926.1101(b). As supervisor of the entire project, WESTON or the responsible general contractor will ascertain whether the asbestos contractor is in compliance with the asbestos standard, and will require such contractor to come into compliance with 29 CFR 1926.1101 when necessary.

#### **Regulated Areas [under 29 CFR 1926.1101]**

**All Class I, II, and III asbestos work will be conducted within regulated areas.** All other operations covered by asbestos standards will be conducted within a regulated area where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed a PEL. Regulated areas will comply with the following requirements of 29 CFR 1926.1101(2), (3), (4), and (5).

- **Demarcation:** The regulated area will be demarcated to minimize the number of persons within the area and protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they will be used to demarcate the regulated area. Signs will be provided and displayed pursuant to the requirements of subsection 29 CFR 1926.1101(k)(7).
- **Access:** Access to regulated areas will be limited to authorized persons and to persons authorized by the 29 CFR 1926.1101.
- **Respirators:** All persons entering a regulated area where employees are required by 29 CFR 1926.1101(h)(1) to wear respirators will be supplied with a respirator selected in accordance with 29 CFR 1926.1101(h)(2) and 29 CFR 1910.134.
- **Prohibited Activities:** WESTON will ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.

#### **Regulated Areas [under 29 CFR 1910.1001(e)]**

- **Establishment:** WESTON will establish regulated areas wherever airborne concentrations of asbestos and/or PACM are in excess of the TWA and/or excursion limit prescribed in 29 CFR 1910.1001(c).
- **Demarcation:** Regulated areas shall be demarcated from the rest of the workplace in any manner that minimizes the number of persons who will be exposed to asbestos.
- **Access:** Access to regulated areas shall be limited to authorized persons or to persons authorized by the Act or regulations issued pursuant thereto.
- **Provision of Respirators:** Each person entering a regulated area shall be supplied with and required to use a respirator, selected in accordance with 29 CFR 1910.1001(g)(2).
- **Prohibited Activities:** The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated areas.

## **Exposure Assessments and Monitoring**

### **1. General Monitoring Criteria**

When WESTON has a workplace or work operation where exposure monitoring is required under 29 CFR 1926.1101, WESTON will ensure monitoring is performed to determine accurately the airborne concentrations of asbestos to which employees may be exposed.

Determinations of employee exposure will be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee.

Representative 8-hour TWA employee exposure will be determined on the basis of one or more samples representing full-shift exposure for employees in each work area. Representative 30-minute short-term employee exposures will be determined on the basis of one or more samples representing 30 minute exposures associated with operations that are most likely to produce exposures above the excursion limit for employees in each work area.

### **2. Initial Exposure Assessment**

For asbestos projects covered by the standard WESTON will ensure that a "competent person" conducts an exposure assessment immediately before or at the initiation of the operation to ascertain expected exposures during that operation or workplace.

The assessment must be completed in time to comply with requirements that are triggered by exposure data or the lack of a "negative exposure assessment," and to provide information necessary to assure that all control systems planned are appropriate for that operation and will work properly.

### **3. Basis of Initial Exposure Assessment**

Unless a negative exposure assessment has been made pursuant to 29 CFR 1926.1101(f)(2)(iii), the initial exposure assessment will, if feasible, be based on monitoring conducted according to 29 CFR 1926.1101(f)(1)(iii). The assessment will take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the employer which indicate the levels of airborne asbestos likely to be encountered on the job.

For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of the PELs, or otherwise makes a negative exposure assessment pursuant to 29 CFR 1926.1101(f)(2)(iii), WESTON will presume that employees are exposed in excess of the TWA and excursion limit.

### **4. Negative Exposure Assessment**

For any one specific asbestos job which will be performed by employees who have been trained in compliance with the standard, a negative exposure assessment demonstrates that employee exposures will be below the PELs by data which conform to the following criteria:

- Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the TWA and excursion limit under those work conditions having the greatest potential for releasing asbestos; or

- WESTON has monitoring data from prior asbestos jobs for the 8-hour PEL and the excursion limit within 12 months of the current or projected job, the monitoring and analysis must have been performed in compliance with the asbestos standard in effect; and the data must have been obtained during work conducted under conditions "closely resembling" the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in WESTON's current operations. The operations must have been conducted by employees whose training and experience are no more extensive than that of employees performing the current job, and, the data shows that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that employee exposures will not exceed the TWA and excursion limit, or
- The results of initial exposure monitoring of the current job made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee covering operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

#### 5. Periodic Monitoring

WESTON will ensure that for all Class I and II operations daily monitoring representative of the exposure of each employee who is assigned to work within a regulated area, will be conducted unless a negative exposure assessment for the entire operation has been made.

Periodic monitoring of all work where exposures are expected to exceed a PEL, will be conducted at intervals sufficient to document the validity of the exposure prediction for all operations other than Class I and II operations.

Exception: When all employees required to be monitored daily are equipped with supplied-air respirators operated in the positive-pressure mode, the employer may dispense with the daily monitoring required by this paragraph. However, employees performing Class I work using a control method which is not listed in 29 CFR 1926.1101(g)(4)(i), (ii), or (iii), or using a modification of a listed control method, will continue to be monitored daily even if they are equipped with supplied-air respirators.

#### 6. Termination of Monitoring

If the periodic monitoring required by 29 CFR 1926.1101(f)(3) reveals that employee exposures, as indicated by statistically reliable measurement, are below the permissible exposure limit and excursion limit the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

Additional monitoring will be provided whenever there has been a change in: process, control equipment, personnel or work practices that may result in new or additional exposures above the PEL and/or excursion limit. Additional monitoring will also be provided when the employer has any reason to suspect that a change may result in new or additional exposures above the PEL and/or excursion limit. Such additional monitoring is required regardless of whether a "negative exposure assessment" was previously produced for a specific job.

#### 7. Observation of Monitoring

Affected employees and their designated representatives will be afforded an opportunity to observe any monitoring of employee exposure to asbestos conducted in accordance with this section.

When observation of the monitoring of employee exposure to asbestos requires entry into an area where the use of protective clothing or equipment is required, the observer will be provided with and be required to use such clothing and equipment and will comply with all other applicable safety and health procedures.

### **Methods of Compliance**

Prior to beginning an asbestos project, WESTON will supplement this written program, with a site-specific Health and Safety Plan (HASP), to reduce employee exposure below the TWA and the excursion limit by establishing site-specific engineering, work practice controls, and respiratory protection, and implementing the Health and Safety Plan.

Written programs and site-specific HASPs will be submitted upon request for examination and copying to the Assistant Secretary, the Director, affected employees and designated employee representatives.

The site-specific HASP will include, as a minimum, the procedures, practices and prohibitions identified in this Program and good practice to minimize employee exposure to asbestos and comply with regulations.

### **Engineering Controls and Work Practices**

WESTON will use the following engineering controls and work practices in all operations covered by this section, regardless of the levels of exposure:

- Vacuum cleaners equipped with HEPA filters to collect all debris and dust containing ACM and PACM, except as provided in 29 CFR 1926.1101(g)(8)(ii) in the case of roofing material.
- Wet methods, or wetting agents, to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup, except where employers demonstrate that the use of wet methods is infeasible due to for example, the creation of electrical hazards, equipment malfunction, and, in roofing, except as provide in 29 CFR 1926.1101(g)(8)(ii); and
- Prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers except in roofing operations, where the procedures specified in 29 CFR 1926.1101(g)(8)(ii) apply.

In addition to the requirements of 29 CFR 1926.1101(g)(1), WESTON will use the following control methods to achieve compliance with the TWA PEL and excursion limit prescribed by 29 CFR 1926.1101(c):

- Local exhaust ventilation equipped with HEPA filter dust collection systems;
- Enclosure or isolation of processes producing asbestos dust;
- Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;
- Use of other work practices and engineering controls that the Assistant Secretary can show to be feasible.

Wherever the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the PEL and/or excursion limit prescribed in 29 CFR 1926.1101(c), WESTON will use them to reduce employee exposure to the lowest levels attainable by these controls and

will supplement them by the use of respiratory protection that complies with the requirements of 29 CFR 1926.1101(h).

### Prohibitions

The following work practices and engineering controls will not be used for work related to asbestos or for work which disturbs ACM or PACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

- High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
- Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- Dry sweeping, shoveling or other dry clean-up of dust and debris containing ACM and PACM.
- Employee rotation as a means of reducing employee exposure to asbestos.

### **Class I Requirements**

In addition to the provisions of 29 CFR 1926.1101(g)(1) and (2), the following engineering controls and work practices and procedures will be used:

- All Class I work, including the installation and operation of the control system will be supervised by a competent person as defined in 29 CFR 1926.1101(b);
- For all Class I jobs involving the removal of more than 25 linear or 10 square feet of thermal system insulation or surfacing material; for all other Class I jobs, where WESTON cannot produce a negative exposure assessment as provided for in 29 CFR 1926.1101(f)(2)(iii), or where employees are working in areas adjacent to the regulated area, while the Class I work is being performed, WESTON will ensure one of the following methods to ensure that airborne asbestos does not migrate from the regulated area is used:
  - WESTON will ensure that critical barriers are placed over all the openings to the regulated area, except where activities are performed outdoors; or
  - WESTON will ensure use of another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area surveillance during each work shift at each boundary of the regulated area, showing no visible asbestos dust; and perimeter area monitoring showing that clearance levels contained in 40 CFR Part 763, Subpart. E, of the EPA Asbestos in Schools Rule are met, or that perimeter area levels, measured by Phase Contrast Microscopy (PCM) are no more than background levels representing the same area before the asbestos work began. The results of such monitoring will be made known to WESTON no later than 24 hours from the end of the work shift represented by such monitoring. Exception: For work completed outdoors where employees are not working in areas adjacent to the regulated areas, 29 CFR 1926.1101(g)(4)(ii) is satisfied when the specific control methods in 29 CFR 1926.1101(g)(5) are used.
- For all Class I jobs, HVAC systems will be isolated in the regulated area by sealing with a double layer of 6 mil plastic or the equivalent;
- For all Class I jobs, impermeable drop-cloths will be placed on surfaces beneath all removal activity;

- For all Class I jobs, all objects within the regulated area will be covered with impermeable drop-cloths or plastic sheeting which is secured by duct tape or an equivalent.
- For all Class I jobs where WESTON cannot produce a negative exposure assessment, or where exposure monitoring shows that a PEL is exceeded, the WESTON will ventilate the regulated area to move contaminated air away from the breathing zone of employees toward a HEPA filtration or collection device.

### **Specific Control Methods for Class I Work**

In addition, WESTON will perform Class I asbestos work using one or more of the following control methods pursuant to the limitations stated below:

#### **Negative Pressure Enclosure (NPE) Systems**

NPE systems may be used where the configuration of the work area does not make the erection of the enclosure infeasible, with the following specifications and work practices:

- Specifications
  - The NPE may be of any configuration;
  - At least 4 air changes per hour must be maintained in the NPE;
  - A minimum of -0.02 column inches of water pressure differential, relative to outside pressure, must be maintained within the NPE as evidenced by manometric measurements;
  - The NPE must be kept under negative pressure throughout the period of its use; and
  - Air movement must be directed away from employees performing asbestos work within the enclosure, and toward a HEPA filtration or a collection device.
- Work Practices
  - Before beginning work within the enclosure and at the beginning of each shift, the NPE will be inspected for breaches and smoke-tested for leaks, and any leaks sealed.
  - Electrical circuits in the enclosure will be deactivated, unless equipped with ground-fault circuit interrupters.

#### **Glove Bag Systems**

Glove bag systems may be used to remove PACM and/or ACM from straight runs of piping and elbows and other connections with the following specifications and work practices:

- Specifications
  - Glove-bags must be made of 6 mil thick plastic and will be seamless at the bottom.
  - Glove-bags used on elbows and other connections must be designed for that purpose and used without modifications.
- Work Practices
  - Each glove-bag must be installed so that it completely covers the circumference of pipe or other structure where the work is to be done.
  - Glove-bags must be smoke-tested for leaks and any leaks sealed prior to use.

- Glove-bags may be used only once and may not be moved.
- Glove-bags must not be used on surfaces whose temperature exceeds 150 deg. F.
- Prior to disposal, glove-bags must be collapsed by removing air within them using a HEPA vacuum.
- Before beginning the operation, loose and friable material adjacent to the glove-bag/box operation must be wrapped and sealed in two layers of six mil plastic or otherwise rendered intact.
- Where system uses attached waste bag, such bag must be connected to collection bag using hose or other material which must withstand pressure of ACM waste and water without losing its integrity.
- A sliding valve or other device must separate waste bag from hose to ensure no exposure when waste bag is disconnected.
- At least two persons must perform Class I glove-bag removal operations.

#### Negative Pressure Glove Bag Systems

Negative pressure glove bag systems may be used to remove ACM or PACM from piping.

- Specifications
  - In addition to specifications for glove bag systems above, negative pressure glove bag systems must attach HEPA vacuum systems or other devices to bag to prevent collapse during removal.
- Work Practices
  - WESTON will ensure operations comply with the work practices for glove bag systems in 29 CFR 1926.1101(g)(5)(ii)(B)(4).
  - The HEPA vacuum cleaner or other device used to prevent collapse of bag during removal will run continually during the operation until it is completed at which time the bag will be collapsed prior to removal of the bag from the pipe.
  - Where a separate waste bag is used along with a collection bag and discarded after one use, the collection bag may be reused if rinsed clean with amended water before reuse.

#### Negative Pressure Glove Box Systems

Negative pressure glove boxes may be used to remove ACM or PACM from pipe runs with the following specifications and work practices.

- Specifications
  - Glove boxes will be constructed with rigid sides and made from metal or other material which can withstand the weight of the ACM and PACM and water used during removal;
  - A negative pressure generator will be used to create negative pressure in the system;
  - An air filtration unit will be attached to the box;
  - The box will be fitted with gloved apertures;
  - An aperture at the base of the box will serve as a bagging outlet for waste ACM and water;

- A back-up generator will be present on site;
- Waste bags will consist of 6 mil thick plastic double-bagged before they are filled or plastic thicker than 6 mil.
- Work Practices
  - At least two persons will perform the removal;
  - The box will be smoke-tested for leaks and any leaks sealed prior to each use;
  - Loose or damaged ACM adjacent to the box will be wrapped and sealed in two layers of 6 mil plastic prior to the job, or otherwise made intact prior to the job;
  - A HEPA filtration system will be used to maintain pressure barrier in box.

#### Water Spray Process System

A water spray process system may be used for removal of ACM and PACM from cold line piping if, employees carrying out such process have completed a 40-hour separate training course in its use, in addition to training required for employees performing Class I work. The system will meet the following specifications and work will be performed by employees using the following work practices.

- Specifications
  - Piping will be surrounded on 3 sides by rigid framing,
  - A 360 degree water spray, delivered through nozzles supplied by a high pressure separate water line, will be formed around the piping.
  - The spray will collide to form a fine aerosol which provides a liquid barrier between workers and the ACM and PACM.
- Work Practices
  - The system will be run for at least 10 minutes before removal begins.
  - All removal will take place within the water barrier.
  - The system will be operated by at least three persons, one of whom will not perform removal, but will check equipment, and ensure proper operation of the system.
  - After removal, ACM and PACM will be bagged while still inside the water barrier.

#### Walk-In Enclosure

A small walk-in enclosure which accommodates no more than two persons (mini-enclosure) may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices.

- Specifications
  - The fabricated or job-made enclosure will be constructed of 6 mil plastic or equivalent.
  - The enclosure will be placed under negative pressure by means of a HEPA filtered vacuum or similar ventilation unit.
- Work practices
  - Before use, the mini-enclosure will be inspected for leaks and smoke-tested to detect breaches, and breaches sealed.

- Before reuse, the interior will be completely washed with amended water and HEPA-vacuumed.
- During use, air movement will be directed away from the employee's breathing zone within the mini-enclosure.

#### **Alternative Control Methods for Class I Work**

WESTON may perform Class I work using a control method which is not referenced in 29 CFR 1926.1101(g)(5), or which modifies a control method referenced in 29 CFR 1926.1101(g)(5), if the following provisions are complied with:

- The control method will enclose, contain or isolate the processes or source of airborne asbestos dust, or otherwise capture or redirect such dust before it enters the breathing zone of employees.
- A certified industrial hygienist or licensed professional engineer who is also qualified as a project designer as defined in 29 CFR 1926.1101(b), evaluates the work area, the projected work practices, and the engineering controls and certifies in writing that the planned control method is adequate to reduce direct and indirect employee exposure to below the PELs under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA's Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria in 29 CFR 1926.1101(g)(4)(ii)(B).
- Where the TSI or surfacing material to be removed is 25 linear or 10 square feet or less, the evaluation required in 29 CFR 1926.1101(g)(6) may be performed by a "competent person", and may omit consideration of perimeter or clearance monitoring otherwise required.
- The evaluation of employee exposure required in 29 CFR 1926.1101(g)(6) will include and be based on sampling and analytical data representing employee exposure during the use of such method under worst-case conditions and by employees whose training and experience are equivalent to employees who are to perform the current job.

#### **Work Practices and Engineering Controls for Class II Work**

All Class II work will be supervised by a competent person as defined in 29 CFR 1926.1101(b).

For all indoor Class II jobs, where WESTON has not produced a negative exposure assessment provided for in 29 CFR 1926.1101(f)(2)(iii), or where during the job, changed conditions indicate there may be exposure above the PEL or where WESTON does not remove the ACM in a substantially intact state, WESTON will ensure use of one of the following methods so that airborne asbestos does not migrate from the regulated area:

- Critical barriers will be placed over all openings to the regulated area; or, WESTON will ensure use of another barrier or isolation method which prevents migration of airborne asbestos from the regulated area, as verified by perimeter area monitoring or clearance monitoring that meets criteria set by 29 CFR 1926.1101. (g)(4)(ii)(B).
- Impermeable drop-cloths will be placed on surfaces beneath all removal activity.
- All Class II asbestos work will be performed using the work practices and requirements set out in 29 CFR 1926.1101(g)(1)(i) through (g)(1)(iii).

### **Additional Controls for Class II Work**

Class II asbestos work may also be performed by complying with the work practices and controls designated for each type of asbestos work to be performed, set out in 29 CFR 1926.1101. Where more than one control method may be used for a type of asbestos work, WESTON may choose one or a combination of designated control methods. Class II work also may be performed using a method allowed for Class I work, except that glove bags and glove boxes are allowed if they fully enclose the Class II material to be removed.

#### **Flooring**

For removing vinyl and asphalt flooring materials which contain ACM or for which in buildings constructed no later than 1980, and WESTON has not verified the absence of ACM as in 29 CFR 1926.1101(g)(8)(i)(I), WESTON will ensure that employees comply with the following work practices and are trained in these practices in accordance with 29 CFR 1926.1101(k)(9).

- Flooring or its backing will not be sanded.
- Vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) will be used to clean floors.
- Resilient sheeting will be removed by cutting with wetting of the snip point and wetting during de-lamination. Rip-up of resilient sheet floor material is prohibited.
- All scraping of residual adhesive and/or backing will be performed using wet methods.
- Dry sweeping is prohibited.
- Mechanical chipping is prohibited unless performed in a negative pressure enclosure which meets the requirements of 29 CFR 1926.1101(g)(5)(i).
- Tiles will be removed intact, unless WESTON demonstrates that intact removal is not possible.
- When tiles are heated and can be removed intact, wetting may be omitted.
- Resilient flooring material including associated mastic and backing will be assumed to be asbestos-containing unless an industrial hygienist determines that it is asbestos-free using recognized analytical techniques.

#### **Roofing**

For removing roofing material which contains ACM, WESTON will ensure that the following work practices are followed:

- Roofing material will be removed in an intact state to the extent feasible.
- Wet methods will be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless wet methods are not feasible or will create safety hazards.
- Cutting machines will be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.
- When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operation will be collected by a HEPA dust collector, or will be HEPA vacuumed by vacuuming along the cut line. When removing built-up roofs with asbestos-containing roofing felts and a smooth surface using a power roof cutter, the dust resulting from the cutting operation will be collected either by a HEPA

dust collector or HEPA vacuuming along the cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line.

- Asbestos-containing material that has been removed from a roof will not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it will be lowered to the ground via covered, dust-tight chute, crane or hoist.
- Any ACM that is not intact will be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof it will either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.
- Intact ACM will be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.
- Upon being lowered, unwrapped material will be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.
- Roof level heating and ventilation air intake sources will be isolated or the ventilation system will be shut down.
- Notwithstanding any other provision of this section, removal or repair of sections of intact roofing less than 25 square feet in area does not require use of wet methods or HEPA vacuuming as long as manual methods which do not render the material non-intact are used to remove the material and no visible dust is created by the removal method used. In determining whether a job involves less than 25 square feet, WESTON will include all removal and repair work performed on the same roof on the same day.

#### Siding, Shingles, or Transite Panels

When removing cementitious asbestos-containing siding and shingles or transite panels containing ACM on building exteriors other than roofs [see above and 29 CFR 1926.1101(g)(8)(ii)], WESTON will ensure that the following work practices are followed:

- Cutting, abrading or breaking siding, shingles, or transite panels, will be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release cannot be used.
- Each panel or shingle will be sprayed with amended water prior to removal.
- Unwrapped or unbagged panels or shingles will be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.
- Nails will be cut with flat, sharp instruments.

#### Gaskets

When removing gaskets containing ACM, WESTON will ensure that the following work practices are followed:

- If a gasket is visibly deteriorated and unlikely to be removed intact, removal will be undertaken within a glove-bag as described in 29 CFR 1926.1101(g)(5)(ii).
- The gasket will be immediately placed in a disposal container.
- Any scraping to remove residue will be performed wet.

### Other Class II Removal

When performing any other Class II removal of ACM for which specific controls have not been listed in 29 CFR 1926.1101(g)(8)(iv)(A) through (D), WESTON will ensure compliance with the following work practices:

- The material will be thoroughly wetted with amended water prior to and during its removal.
- The material will be removed in an intact state unless WESTON demonstrates that intact removal is not possible.
- Cutting, abrading or breaking the material will be prohibited unless WESTON can demonstrate that methods less likely to result in asbestos fiber release are not feasible.
- Asbestos-containing material removed will be immediately bagged or wrapped, or kept wetted, until transferred to a closed receptacle, no later than the end of the work shift.

### Alternative Work Practices and Controls

Instead of the work practices and controls listed in 29 CFR 1926.1101(g)(8)(i) through (v), WESTON may use different or modified engineering and work practice controls if the following provisions are complied with:

- WESTON can demonstrate by data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used, that employee exposure will not exceed the PELs under any anticipated circumstances.
- A competent person evaluates the work area, the projected work practices and the engineering controls, and will certify in writing, that the different or modified controls are adequate to reduce direct and indirect employee exposure to below the PELs under all expected conditions of use and that the method meets the requirements of 29 CFR 1926.1101. The evaluation will include and be based on data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used for the current job, and by employees whose training and experience are equivalent to employees who are to perform the current job.

### **Work Practices and Engineering Controls for Class III Asbestos Work**

Class III asbestos work will be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees.

- The work will be performed using wet methods.
- To the extent feasible, the work will be performed using local exhaust ventilation.
- Where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material, WESTON will ensure use of impermeable drop-cloths, and isolation of the operation using mini-enclosures or glove bag systems as in 29 CFR 1926.1101(g)(5) or another isolation method.
- Where WESTON has not produced a negative exposure assessment for a job, or where monitoring results show the PEL has been exceeded, WESTON will ensure containment of the area using impermeable drop-cloths and plastic barriers or their equivalent, or will ensure isolation of the operation using a control system listed in and in compliance 29 CFR 1926.1101(g)(5).

- Employees performing Class III jobs, which involve the disturbance of thermal system insulation or surfacing material, or where WESTON has not produced a negative exposure assessment, or where monitoring results show a PEL has been exceeded, will wear respirators which are selected, used and fitted pursuant to provisions of 29 CFR 1926.1101(h).

#### **Class IV Asbestos Work**

Class IV asbestos jobs will be conducted by employees trained pursuant to the asbestos awareness training program set out in 29 CFR 1926.1101(k)(9). In addition, all Class IV jobs will be conducted in conformity with the requirements set out in 29 CFR 1926.1101(g)(1), mandating wet methods, HEPA vacuums, and prompt clean up of debris containing ACM or PACM.

- Employees cleaning up debris and waste in a regulated area where respirators are required will wear respirators which are selected, used and fitted pursuant to provisions of 29 CFR 1926.1101(h).
- Employers of employees who clean up waste and debris in, and employers in control of, areas where friable thermal system insulation or surfacing material is accessible, will assume that such waste and debris contain asbestos.

#### **Alternative Methods of Compliance for Installation, Removal, Repair, and Maintenance of Certain Roofing and Pipeline Coating Materials**

Notwithstanding any other provision of 29 CFR 1926.1101, WESTON will comply with all provisions of 29 CFR 1926.1101(g)(11) when installing, removing, repairing, or maintaining intact pipeline asphaltic wrap, or roof flashings which contain asbestos fibers encapsulated or coated by bituminous or resinous compounds and will be deemed to be in compliance with 29 CFR 1926.1101. If WESTON does not comply with all provisions of 29 CFR 1926.1101(g)(11) or if during the course of the job the material does not remain intact, the provisions of 29 CFR 1926.1101(g)(8) will be used instead of 29 CFR 1926.1101(g)(11).

- Before work begins and as needed during the job, a competent person who is capable of identifying asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and who has the authority to take prompt corrective measures to eliminate such hazards, will conduct an inspection of the worksite and determine that the roofing material is intact and will likely remain intact.
- All employees performing work covered by 29 CFR 1926.1101(g)(11) will be trained in a training program that meets the requirements of 29 CFR 1926.1101(k)(9)(viii).
- The material will not be sanded, abraded, or ground. Manual methods which do not render the material non-intact will be used.
- Material that has been removed from a roof will not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it will be lowered to the ground via covered, dust-tight chute, crane or hoist. All such material will be removed from the roof as soon as is practicable, but in any event no later than the end of the work shift.
- Where roofing products which have been labeled as containing asbestos according to 29 CFR 1926.1101(k)(8) are installed on non-residential roofs during operations covered by 29 CFR 1926.1101(g)(11), WESTON will ensure the building owner is notified of the presence and location of such materials no later than the end of the job.
- All removal or disturbance of pipeline asphaltic wrap will be performed using wet methods.

## **Respiratory Protection**

No employee will be assigned to asbestos work that requires respirator use if, based on their most recent medical examination, the examining physician determines that the employee will be unable to function normally while using a respirator, or that the safety or health of the employee or other employees will be impaired by the employee's respirator use. Such employees must be assigned to another job or given the opportunity to transfer to a different position that they can perform. If such a transfer position is available, it must be with the same employer, in the same geographical area, and with the same seniority, status, rate of pay, and other job benefits the employee had just prior to such transfer.

### **Respirator Use**

Respiratory Protection will be used in accordance with WESTON's Respiratory Protection Program, in compliance with 29 CFR 1910.134 and under the following conditions:

- During the interval necessary to install or implement feasible engineering and work practice controls;
- In work operations, such as maintenance and repair activities, or other activities for which engineering and work practice controls are not feasible;
- In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the TWA and/or excursion limit;
- During all Class I asbestos jobs;
- During all Class II and III asbestos jobs where a "negative exposure assessment" has not been produced;
- During all Class III jobs where TSI or surfacing ACM or PACM is being disturbed;
- Class IV asbestos work performed within regulated areas where employees who are performing other work are required to use respirators;
- During all work covered by 29 CFR 1926.1101 where employees are exposed above the TWA or excursion limit; and
- In emergencies.

Each employee who uses a filter respirator for protection will be permitted to change the filter elements whenever an increase in breathing resistance is detected and WESTON will maintain an adequate supply of filter elements for this purpose.

Employees who wear respirators will be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

### **Respirator Selection**

Where respirators are required this plan and 29 CFR 1926.1101, the appropriate respirator specified in Table 1 will be used.

**NOTE: Filtering facepiece (Dust Mask) respirators are prohibited for protection from asbestos.**

**TABLE 1. RESPIRATORY PROTECTION FOR ASBESTOS FIBERS**

Type of Respirator <sup>1,2</sup>	Quarter Mask	Half Mask	Full Facepiece	Helmet/Hood	Loose-fitting Facepiece
1. Air-Purifying Respirator (APR)	5	10 <sup>3</sup>	50		
2. Powered Air-Purifying Respirator (PAPR)		50	1,000	25/1,000 <sup>4</sup>	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode		10	50		
• Continuous flow mode		50	1,000	25/1,000 <sup>4</sup>	25
• Pressure-demand or other positive-pressure mode		50	1,000		
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode		10	50	50	
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)			10,000	10,000	

**Notes:**

These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 Subpart Z, WESTON will refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

1. WESTON may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.
2. The assigned protection factors in Table 1 are only effective when used in conjunction with WESTON's continuing, effective Respiratory Protection Program as required by 29 CFR 1910.134 which includes training, fit testing, maintenance, and use requirements.
3. This APF category includes filtering face pieces, and half masks with elastomeric face pieces.
4. WESTON will have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting face piece respirators, and receive an APF of 25.

WESTON will provide a powered, air purifying respirator (APR) in lieu of any negative pressure respirator specified in Table 1 whenever an employee chooses to use this type of respirator; and this respirator will provide adequate protection to the employee.

WESTON will provide a half-mask APR, other than a disposable respirator, that is equipped with high-efficiency filters when the employee performs:

- Class II and III asbestos work and a negative-exposure assessment have not been conducted.
- Class III asbestos work when TSI or surfacing ACM or PACM is being disturbed.

In addition to the above selection criteria, when employees are in a regulated area where Class I work is being performed, a negative exposure assessment of the area has not been produced, and the exposure assessment of the area indicates the exposure level will not exceed 1 f/cc as an 8-hour TWA, WESTON will ensure employees are provided with one of the following respirators:

- A tight-fitting powered APR equipped with high efficiency filters; or
- A full face-piece SAR operated in the pressure-demand mode equipped with HEPA egress cartridges.

**Note:** A high efficiency or P, N, or R 100 filter means a filter that is at least 99.97% efficient against mono-dispersed particles of 0.3 micrometers in diameter or larger.

Whenever employees are working in a regulated area performing Class I work where a negative exposure assessment is not available and the exposure assessment indicates that the exposure level will be above 1 f/cc as an 8-hour TWA, a full face piece supplied-air respirator operated in the pressure-demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus will be provided.

Respirators must be those certified as acceptable for protection by the NIOSH.

Qualitative fit-tests (QLFT) protocols may only be used for fit-testing negative pressure air purifying respirators that must achieve a fit factor of 10 or less.

### **Protective Work Clothing and Equipment**

WESTON will provide personal protective equipment and ensure that it is used according to WESTON's Personal Protective Equipment program whenever employees are:

- Exposed to asbestos above the TWA and/or the excursion limit, or;
- Exposed to asbestos for which a required negative exposure assessment is not produced, or;
- Performing Class I operations that involves the removal of over 25 linear or 10 square feet of TSI or surfacing ACM and PACM, procedures will be implemented to ensure that employees uses appropriate protective work clothing.

WESTON's Personal Protective Equipment program conforms to applicable standards and specifications and includes, but is not limited to, coveralls or similar full-body work clothing, gloves, head coverings, and foot coverings.

### **Laundering**

WESTON will ensure that contaminated reusable clothing is laundered to prevent the release of airborne asbestos in excess of the TWA or excursion limit prescribed in 29 CFR 1926.1101(c).

If contaminated clothing is given to another person for laundering, WESTON will ensure such person is informed of the requirement in 29 CFR 1926.1101(i)(2)(i) to effectively prevent the release of airborne asbestos in excess of the TWA and excursion limit prescribed in 29 CFR 1926.1101(c).

### **Contaminated Clothing**

Contaminated clothing will be transported in sealed impermeable bags, or other closed, impermeable containers, and be labeled in accordance with 29 CFR 1926.1101(k).

### Inspection of Protective Clothing

The competent person will examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears will be immediately mended, or the work suit will be immediately replaced.

### Hygiene Facilities and Practices for Employees (applicable to jobs involving over 25 linear or 10 square feet of TSI or surfacing ACM and PACM)

WESTON will ensure compliance with the following requirements for employees performing Class I asbestos jobs involving over 25 linear or 10 square feet of TSI or surfacing ACM and PACM.

### **Decontamination Areas**

WESTON will ensure a decontamination area is established that is adjacent to and connected to the regulated area for the decontamination of employees who have been in the regulated area. The decontamination area will consist of an equipment room, shower area, and clean room in series. WESTON will ensure that employees enter and exit the regulated area through the decontamination area.

### Equipment Room

The equipment room will be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective equipment.

### Shower Area

WESTON will provide shower facilities which comply with 29 CFR 1910.141(d)(3), unless WESTON can demonstrate that they are not feasible. The showers will be adjacent both to the equipment room and the clean room, unless WESTON can demonstrate that this location is not feasible. Where WESTON can demonstrate that it is not feasible to locate the shower between the equipment room and the clean room, or where the work is performed outdoors, WESTON will ensure that employees:

Remove asbestos contamination from their work suits in the equipment room using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or

Remove their contaminated work suits in the equipment room, then don clean work suits, and proceed to a shower that is not adjacent to the work area.

### Clean Change Room

The clean room will be equipped with a locker or appropriate storage container for each employee's use. When WESTON can demonstrate that it is not feasible to provide a clean change area adjacent to the work area or where the work is performed outdoors, WESTON may permit employees engaged in Class I asbestos jobs to clean their protective clothing with a portable HEPA-equipped vacuum before these employees leave the regulated area. Following showering, these employees, however, must then change into street clothing in clean change areas provided by WESTON which otherwise meets the requirements of 29 CFR 1926.1101.

### Decontamination Area Entry Procedures

WESTON will ensure that employees:

- (a) Enter the decontamination area through the clean room;
- (b) Remove and deposit street clothing within a locker provided for their use; and
- (c) Put on protective clothing and respiratory protection before leaving the clean room.
- (d) Employees pass through the equipment room before entering the regulated area.

#### Decontamination Area Exit Procedures

WESTON will ensure that employees will:

- (a) Remove all gross contamination and debris from their protective clothing before leaving the regulated area.
- (b) Remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers.
- (c) Not remove their respirators in the equipment room.
- (d) Shower prior to entering the clean room.
- (e) Enter the clean room before changing into street clothes, after showering.

#### Lunch Areas

Whenever food or beverages are consumed at the worksite where employees are performing Class I asbestos work, WESTON will ensure lunch areas are provided in which the airborne concentrations of asbestos are below the permissible exposure limit and/or excursion limit.

Hygiene Facilities and Practices for Employees (applicable to jobs involving less than 25 linear or 10 square feet of TSI or surfacing ACM and PACM and Class II and Class III asbestos work as specified below)

WESTON will ensure compliance with requirements for Class I work involving less than 25 linear or 10 square feet of TSI or surfacing ACM and PACM, and for Class II and Class III asbestos work operations where exposures exceed a PEL, or where there is no negative exposure assessment produced before the operation.

#### **Equipment Room/Area for Decontamination**

WESTON will ensure that an equipment room (or area that is adjacent to the regulated area) is established for the decontamination of employees and their equipment which is contaminated with asbestos. The equipment room/area will consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface.

The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area (as determined by visible accumulations).

Work clothing must be cleaned with a HEPA vacuum before it is removed.

All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area.

WESTON will ensure that employees enter and exit the regulated area through the equipment room or area.

#### Hygiene Facilities and Practices for Employees (applicable to Class IV work)

WESTON will ensure that employees performing Class IV work within a regulated area comply with the hygiene practice required of employees performing work which has a higher classification within that regulated area. Otherwise WESTON will ensure employees cleaning up debris and material which is TSI or surfacing ACM or identified as PACM are provided decontamination facilities which are required by 29 CFR 1926.1101(j)(2).

#### Smoking in Work Areas

WESTON will ensure that employees do not smoke in work areas where they are occupationally exposed to asbestos because of activities in that work area.

#### Communication of Hazards

This section applies to the communication of information concerning asbestos hazards in construction activities to facilitate compliance with 29 CFR 1926.1101. Most asbestos-related construction activities involve previously installed building materials. Building owners often are the only and/or best sources of information concerning them. Therefore, they, along with WESTON, are assigned specific information conveying and retention duties under this section.

#### **Duties of Building and Facility Owners**

Before work subject to this standard is begun, WESTON will confirm through reviews of hard data by a competent person that acceptable surveys have been conducted by building and facility owners to determine the presence, location, and quantity of ACM and/or PACM at the work site pursuant to 29 CFR 1926.1101(k)(1) unless it has been determined in compliance with 29 CFR 1926.1101(k)(5) that the material is not asbestos-containing.

WESTON will ensure that building and/or facility owners have notified in writing the following persons of the presence, location and quantity of ACM or PACM, at the work sites in their buildings and facilities:

Prospective employers applying or bidding for work whose employees reasonably can be expected to work in or adjacent to areas containing such material;

Employees of the owner who will work in or adjacent to areas containing such material:

On multi-employer worksites, all employers of employees who will be performing work within or adjacent to areas containing such materials;

Tenants who will occupy areas containing such material.

#### **Duties of WESTON when Employees Perform Work Subject to 29 CFR 1926.1101 in or Adjacent to Areas Containing ACM and PACM**

Before work in areas containing ACM and PACM is begun; WESTON will ensure the presence, location, and quantity of ACM, and/or PACM therein has been determined and documented according to 29 CFR 1926.1101(k)(1).

Before work under 29 CFR 1926.1101 is performed, WESTON will ensure the following persons are informed of the location and quantity of ACM and/or PACM present in the area and the precautions to be taken to insure that airborne asbestos is confined to the area:

- Owners of the building/facility.
- Employees who will perform such work and employers of employees who work and/or will be working in adjacent areas.

Within 10 days of the completion of such work, WESTON will inform the building/facility owner and employers of employees who will be working in the area of the current location and quantity of PACM and/or ACM remaining in the area and final monitoring results, if any.

In addition to the above requirements, if WESTON discovers ACM and/or PACM on a worksite WESTON will convey information concerning the presence, location and quantity of such newly discovered ACM and/or PACM to the owner and to other employers of employees working at the work site, within 24 hours of the discovery.

#### **Criteria to Rebut the Designation of Installed Material as PACM**

At any time, WESTON and/or a building owner may demonstrate, for purposes of 29 CFR 1926.1101, that PACM does not contain asbestos. Building owners and/or WESTON are not required to communicate information about the presence of building material for which such a demonstration pursuant to the requirements of 29 CFR 1926.1101(k)(5)(ii) has been made. However, in all such cases, the information, data and analysis supporting the determination that PACM does not contain asbestos, must be retained as required by 29 CFR 1926.1101(n). WESTON will require written documentation of this determination to be reviewed by a competent person.

WESTON may demonstrate that PACM does not contain more than 1 percent asbestos by the following:

- Having a completed inspection conducted pursuant to the requirements of AHERA (40 CFR Part 763, Subpart E) which demonstrates that the material is not ACM; or
- Performing a survey by an accredited inspector to include tests of the material containing PACM which demonstrate that no ACM is present in the material. Such tests will include analysis of bulk samples collected in the manner described in 40 CFR 763.86. The tests, evaluation, and sample collection will be conducted by an accredited inspector or by a CIH. Analysis of samples will be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the National Voluntary Laboratory Accreditation Program (NVLAP) or the National Institute for Standards and Technology (NIST) or the Round Robin for bulk samples administered by the American Industrial Hygiene Association (AIHA) or an equivalent nationally-recognized round robin testing program.

WESTON and/or a building owner may demonstrate that flooring material including associated mastic and backing does not contain asbestos, by a determination of an industrial hygienist based upon recognized analytical techniques showing that the material is not ACM. This demonstration will be documented in writing and acceptable to WESTON.

## **Signs**

At the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain ACM and/or PACM, WESTON will ensure that signs are posted which identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that ACM and/or PACM will not be disturbed. WESTON will ensure, to the extent feasible, that employees who come in contact with these signs can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

WESTON will ensure that warning signs that demarcate the regulated area will be provided and displayed at each location where a regulated area is required to be established by 29 CFR 1926.1101(e). Signs will be posted at such a distance from these locations that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.

The warning signs required by 29 CFR 1926.1101(k)(7) will bear the following information.

**DANGER  
ASBESTOS  
CANCER AND LUNG DISEASE HAZARD  
AUTHORIZED PERSONNEL ONLY**

In addition, where the use of respirators and protective clothing are required in the regulated area, the warning signs will include the following:

**RESPIRATORS AND PROTECTION CLOTHING ARE REQUIRED IN THIS AREA**

WESTON will ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by 29 CFR 1926.1101(k)(7)(i). Means to ensure employee comprehension may include the use of foreign languages, pictographs and graphics.

## **Labels**

WESTON will ensure that labels are affixed to all products containing asbestos and to all containers containing such products, including waste containers. Where feasible, installed asbestos products will contain a visible label.

Labels will be printed in large, bold letters on a contrasting background.

Labels will be used in accordance with the requirements of 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard, and will contain the following information:

**DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD**

Labels will contain a warning statement against breathing asbestos fibers.

The provisions for labels required by 29 CFR 1926.1101(k)(8)(i) through (k)(8)(iii) do not apply where:

- (1) Asbestos fibers have been modified by a bonding agent, coating, binder, or other material, provided that the manufacturer can demonstrate that, during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the permissible exposure limit and/or excursion limit will be released, or
- (2) Asbestos is present in a product in concentrations less than 1.0 percent.
- (3) When a building owner or WESTON identifies previously installed PACM and/or ACM, WESTON will ensure labels or signs are affixed or posted so that employees will be notified of what materials contain PACM and/or ACM. WESTON will ensure such labels are attached in areas where they will clearly be noticed by employees who are likely to be exposed, such as at the entrance to mechanical room/areas. Signs required by 29 CFR 1926.1101(k)(6) may be posted in lieu of labels provided they contain information required for labeling. WESTON will ensure, to the extent feasible, that employees who come in contact with these signs or labels can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

### **Employee Information and Training**

WESTON will, at no cost to the employee, institute a training program for all employees who are likely to be exposed in excess of a PEL and for all employees who perform Class I through IV asbestos operations, and will ensure their participation in the program.

Training will be provided prior to or at the time of initial assignment and at least annually thereafter.

Training for Class I operations and for Class II operations that require the use of critical barriers (or equivalent isolation methods) and/or negative pressure enclosures under this section will be the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement workers training (40 CFR Part 763, subpart E, appendix C).

### **Training for other Class II work**

- (1) For work with asbestos-containing roofing materials, flooring materials, siding materials, ceiling tiles, or transite panels, training will include at a minimum all the elements included in 29 CFR 1926.1101(k)(9)(viii), and in addition, the specific work practices and engineering controls set forth in 1926.1101(g) which specifically relate to that category. Such course will include "hands-on" training and will take at least 8 hours.
- (2) An employee who works with more than one of the categories of material specified in 29 CFR 1926.1101(k)(9)(iv)(A) will receive training in the work practices applicable to each category of material that the employee removes and each removal method that the employee uses.
- (3) For Class II operations not involving the categories of material specified in 29 CFR 1926.1101(k)(9)(iv)(A), training will be provided which will include at a minimum all the elements included in 29 CFR 1926.1101(k)(9)(viii) as well as, the specific work practices and engineering controls set forth in 29 CFR 1926(g) which specifically relate to the category of material being removed, and will include "hands-on" training in the work practices applicable to each category of material that the employee removes and each removal method that the employee uses.

Training for Class III employees will be consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2). This course will also include "hands-on" training and will take at least 16 hours.

**Exception:** For Class III operations for which the competent person determines that the EPA curriculum does not adequately cover the training needed to perform that activity, training will include as a minimum all the elements included in 29 CFR 1926.1101(k)(9)(viii) and in addition, the specific work practices and engineering controls set forth in 29 CFR 1926.1101(g) which specifically relate to that activity, and will include "hands-on" training in the work practices applicable to each category of material that the employee disturbs.

Training for employees performing Class IV operations will be consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(1). This course will include available information concerning the locations of thermal system insulation and surfacing ACM/PACM, and asbestos-containing flooring material, or flooring material where the absence of asbestos has not yet been certified; and instruction in recognition of damage, deterioration, and delamination of asbestos containing building materials. Such course will take at least 2 hours.

Training for employees who are likely to be exposed in excess of the PEL and who are not otherwise required to be trained under 29 CFR 1926.1101(k)(9)(iii) through (vi), will meet the requirements of 29 CFR 1926.1101 (k)(9)(viii).

#### Training Program

The training program will be conducted in a manner that the employee is able to understand. In addition to the content required in 29 CFR 1926.1101(k)(9)(iii) through (vi), WESTON will ensure that each such employee is informed of the following:

- Methods of recognizing asbestos, including the requirement in 29 CFR 1926.1101(k)(1) to presume that certain building materials contain asbestos;
- The health effects associated with asbestos exposure;
- The relationship between smoking and asbestos in producing lung cancer;
- The nature of operations that could result in exposure to asbestos, the importance of necessary protective controls to minimize exposure including, as applicable, engineering controls, work practices, respirators, housekeeping procedures, hygiene facilities, protective clothing, decontamination procedures, emergency procedures, and waste disposal procedures, and any necessary instruction in the use of these controls and procedures; where Class III and IV work will be or is performed, the contents of EPA 20T-2003, "Managing Asbestos In-Place" July 1990 or its equivalent in content;
- The purpose, proper use, fitting instructions, and limitations of respirators as required by 29 CFR 1910.134;
- The appropriate work practices for performing the asbestos job;
- Medical surveillance program requirements;
- The content of this standard including appendices;
- The names, addresses and phone numbers of public health organizations which provide information, materials and/or conduct programs concerning smoking cessation. WESTON may

distribute the list of such organizations contained in Appendix J of 29 CFR 1926.1101, to comply with this requirement; and

- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.

#### Access to Training Materials

WESTON will make readily available to affected employees without cost, written materials relating to the employee training program, including a copy of this regulation.

WESTON will provide to the Assistant Secretary and the Director, upon request, all information and training materials relating to the employee information and training program.

WESTON will inform all employees concerning the availability of self-help smoking cessation program material. Upon employee request, WESTON will distribute such material, consisting of NIH Publication No. 89-1647, or equivalent self-help material, approved or published by a public health organization listed in Appendix J to 29 CFR 1926.1101.

WESTON will also provide, at no cost to employees who perform housekeeping operations in an area which contains ACM or PACM, an asbestos awareness training course, which shall at a minimum contain the following elements:

- health effects of asbestos
- locations of ACM and PACM in the building/facility
- recognition of ACM and PACM damage and deterioration
- requirements in this standard relating to housekeeping
- proper response to fiber release episodes

Each such employee shall be so trained at least once a year.

#### **Housekeeping**

Where vacuuming methods are selected, WESTON will ensure that HEPA filtered vacuuming equipment is used. The equipment will be used and emptied in a way that minimizes the reentry of asbestos into the workplace.

#### Waste Disposal

WESTON will ensure that asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing consigned for disposal is collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers except in roofing operations where the procedures specified in 29 CFR 1926.1101(g)(8)(ii) apply.

#### Care of Asbestos-containing Flooring Material

WESTON will ensure that all vinyl and asphalt flooring material is maintained according to 29 CFR 1926.1101 unless the building/facility owner demonstrates, per 29 CFR 1926.1101(g)(8)(i)(I) that the flooring does not contain asbestos. WESTON will also ensure that:

- Sanding of flooring material is prohibited.
- Stripping of finishes will be conducted using low abrasion pads at speeds lower than 300 rpm and wet methods.
- Burnishing or dry buffing may be performed only on flooring which has sufficient finish so that the pad cannot contact the flooring material.

WESTON will ensure that waste and debris and accompanying dust in an area containing accessible thermal system insulation, surfacing ACM/PACM, or visibly deteriorated ACM:

- will not be dusted or swept dry, or vacuumed without using a HEPA filter
- will be promptly cleaned up and disposed of in leak tight containers

### **Medical Monitoring**

WESTON has a very comprehensive and progressive Health and Safety program. This includes a medical surveillance program for all employees who are or will be exposed to airborne concentrations of fibers of asbestos at or above the TWA and/or excursion limit. The effectiveness of this program has been verified through evaluation of results of WESTON's medical monitoring program.

A fully qualified Medical Contractor and Medical Director are integral parts of this program which is based upon demonstrated familiarity with the type of work that WESTON does. The medical evaluation for asbestos workers is provided by and under the direction of highly qualified Board Certified Occupational Physicians. The evaluation is consistent with and certifies employees to work with asbestos according to 29 CFR 1910.1001 and 1926.1101 and to wear respiratory protection according to 29 CFR 1910.134.

WESTON provides medical evaluations as part of the hiring process of workers in several categories as well as at a recurrent frequency based on the work performed. The purpose of WESTON's asbestos medical monitoring program is to:

- Determine WESTON workers fitness to work.
- Monitor health status in conformance with OSHA regulations for asbestos workers.
- Monitor effectiveness of WESTON's Health and Safety Program for asbestos workers.

### **Employees Covered**

Before an employee is assigned to work where airborne concentrations of asbestos fibers may be at or above the TWA and/or excursion limit, a pre-placement medical examination is provided.

The medical evaluations also comply with OSHA 29 CFR 1910.120, Hazardous Waste Site Worker; 29 CFR 1910.1001 and 29 CFR 1926.1101, for asbestos medical monitoring requirements; and 29 CFR 1910.1450 for exposure to hazardous chemicals.

The Initial/Exit and Periodic Protocol Examinations for these workers are used to initially certify and then periodically re-certify WESTON workers as medically fit to perform the jobs at the level of effort described below:

- Asbestos workers are employees who for a combined total of 30 or more days per year are engaged in Class I, II, and III work or are exposed at or above a PEL. For purposes of 29 CFR 1926.1101, any day in which a worker engages in Class II or Class III operations or a combination thereof on intact material for one hour or less (taking into account the entire time

spent on the removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in this standard, will not be counted. WESTON has instituted a medical surveillance program for these employees.

- The program determines fitness to work for employees who work with asbestos.
- Asbestos workers may have to perform a variety of tasks ranging from manual labor such as light to moderate lifting; driving; climbing and working at elevation; to simply observing the activities of other workers. The job assignment of asbestos workers will often determine frequency of lifting and weights of objects to be lifted.
- Many asbestos workers will also require certification to work on hazardous materials sites or in laboratories. All asbestos workers are medically evaluated and qualified to wear respiratory protection as required by 29 CFR 1910.134.

#### Examination Content

##### (1) Initial/Exit Protocol

(a) The Initial/Exit Protocol, medical examination will normally be given as:

- (i) An entrance examination;
- (ii) At exit from potentially hazardous positions; and
- (iii) Termination from WESTON.

(b) The content of the initial and exit examination is provided in Appendix B of this Program.

##### (2) Periodic Protocol

(a) The Periodic Protocol examination will be used for annual assessments for all employees involved in hazardous materials site, asbestos, laboratory, and construction work.

(b) The content of the periodic examination is provided in Appendix B of this Program.

##### (3) Frequency

All items listed under the Initial/Exit and Periodic Protocols described above will be administered annually except as stated below:

CHEST X-RAY - one view (PA only): A PA Chest X-ray is required for all entry and exit examinations and periodically as indicated below:

ASBESTOS workers Chest X-Ray frequency is every two years (unless the worker is over 45 or the employees work with asbestos began more than 10 years ago)

Asbestos workers X-rays must be given a "B" reading.

##### (4) Information Provided to the Physician

(a) WESTON has provided the following information to the examining physician:

- (i) A copy of 29 CFR 1926.1101 and Appendices D and E of the standard.
- (ii) A description of the affected employee's duties as they relate to the employee's exposure.
- (iii) The employee's representative exposure level or anticipated exposure level.

- (iv) A description of any personal protective and respiratory equipment used or to be used.
- (v) Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

**(5) Physician's Written Opinion**

- (a) WESTON obtains a written signed opinion from the examining physician. This written opinion contains the results of the medical examination and will include:
  - (i) The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
  - (ii) Any recommended limitations on the employee or upon the use of personal protective equipment such as clothing or respirators; and
  - (iii) A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions resulting from asbestos exposure that require further explanation or treatment.
  - (iv) A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.
- (6) WESTON has informed the medical consultant/physician to not reveal specific findings or diagnoses unrelated to occupational exposure to asbestos in the written opinion given to WESTON.
- (7) WESTON provides a copy of the physician's written opinion to the affected employee within 30 days from its receipt.

**Medical Records and Employee Right to Access to Medical Records**

Medical records are retained in strict confidence by WESTON's Medical Consultant in accordance with 29 CFR 1910.20.

Employees are informed upon enrollment in WESTON's Medical Monitoring Program and formally reminded annually of their right to access to and to obtain copies of their medical records. They are instructed in how to obtain access and copies. Copies of medical records are provided at no charges to employees.

**Recordkeeping (Objective Data Relied on Pursuant to 29 CFR 1926.1101[f])**

Where WESTON has relied on objective data that demonstrates that products made from or containing asbestos, or the activity involving such products or material are not capable of releasing fibers of asbestos in concentrations at or above the PEL and/or excursion limit under the expected conditions of processing, use, or handling to satisfy the requirements of 29 CFR 1926.1101(f), WESTON will establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.

The record will include at least the following information:

- (1) The product qualifying for exemption.
- (2) The source of the objective data.
- (3) The testing protocol, results of testing, and/or analysis of the material for the release of asbestos.

- (4) A description of the operation exempted and how the data support the exemption.
- (5) Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.

WESTON will retain this record for the duration of the WESTON's reliance upon such objective data.

#### **Exposure Measurement Records**

WESTON keeps an accurate record of all measurements taken to monitor employee exposure to asbestos as prescribed in 29 CFR 1926.1101(f).

**NOTE:** WESTON may use the services of competent organizations such as industry trade associations and employee associations to maintain the records.

This record includes at least the following information:

- (1) The date of measurement;
- (2) The operation involving exposure to asbestos that is being monitored;
- (3) Sampling and analytical methods used and evidence of their accuracy;
- (4) Number, duration, and results of samples taken;
- (5) Type of protective devices worn, if any; and
- (6) Name, social security number, and exposure of the employees whose exposures are represented.

WESTON will maintain this record for at least thirty (30) years, in accordance with 29 CFR 1910.20.

#### **Medical Surveillance Records**

WESTON has established and maintains an accurate record for each employee subject to medical surveillance by 29 CFR 1926.1101(m), in accordance with 29 CFR 1910.20.

The record includes at least the following information:

- (1) The name and social security number of the employee;
- (2) A copy of the employee's medical examination results, including the medical history, questionnaire responses, results of any tests, and physician's recommendations.
- (3) Physician's written opinions;
- (4) Any employee medical complaints related to exposure to asbestos; and
- (5) A copy of the information provided to the physician as required by 29 CFR 1926.1101(m).

WESTON will ensure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with 29 CFR 1910.20.

#### **Training Records**

WESTON will maintain all employee training records for one (1) year beyond the last date of employment by that employer.

### **Data to Rebut PACM**

Where WESTON has relied on data to demonstrate that PACM is not asbestos-containing, such data will be maintained for as long as they are relied upon to rebut the presumption.

### **Records of Required Notifications**

Where the building owner has communicated and received information concerning the identification, location and quantity of ACM and PACM, WESTON will maintain written records of such notifications and their content for the duration of ownership and will be transferred to successive owners of such buildings/facilities.

### **Availability of Records**

WESTON, upon written request, will make all records required to be maintained by this section available to the Assistant Secretary and the Director for examination and copying.

WESTON, upon request, will make any exposure records required by 29 CFR 1926.1101(f) and (n) available for examination and copying to affected employees, former employees, designated representatives, and the Assistant Secretary, in accordance with 29 CFR 1910.20(a) through (e) and (g) through (i).

WESTON, upon request, will make employee medical records required by 29 CFR 1926.1101(m) and (n) available for examination and copying to the subject employee, anyone having the specific written consent of the subject employee, and the Assistant Secretary, in accordance with 29 CFR 1910.20.

### **Transfer of Records**

WESTON will comply with the requirements concerning transfer of records set forth in 29 CFR 1910.20(h).

Should WESTON cease to do business and there is no successor employer to receive and retain the records for the prescribed period; WESTON will notify the Director at least 90 days prior to disposal and, upon request, transmit the records to the Director.

### **Competent Person**

#### Designation of Competent Person

All WESTON asbestos projects will designate a competent person, who is qualified and has the authority to ensure worker safety and health.

In addition to definition in 29 CFR 1926.32 (f), the competent person will be capable of identifying existing asbestos hazards in the workplace; selecting the appropriate control strategy for asbestos exposure, and has the authority to take prompt corrective measures to eliminate hazards, as specified in 29 CFR 1926.32(f).

For Class I and Class II work, the competent person will be specially trained in a course that meets the criteria of EPA's Model Accreditation Plan (40 CFR Part 763) for project designer or supervisor, or its equivalent. For Class III and Class IV work, the competent person will be trained in an operations and maintenance (O&M) course developed by EPA [40 CFR 763.92(a)(2)].

### Specific Responsibilities of the Competent Person

As required by 29 CFR 1926.20(b)(2) and good practice, health and safety accident prevention programs will provide for frequent and regular inspections of the job sites, materials, and equipment to be made by the competent persons.

The competent person will make frequent and regular inspections of the job sites, in order to perform the duties set out in 29 CFR 1926.1101(p)(3)(i) and (ii).

- For Class I jobs, site inspections will be made at least once during each work shift, and at any time an employee requests an inspection.
- For Class II and III jobs, site inspections will be made at intervals sufficient to assess whether conditions have changed, and at any reasonable time an employee requests an inspection.

On all worksites where employees are engaged in Class I or II asbestos work, the competent person designated will perform or supervise the following duties, as applicable:

- (1) Set up the regulated area, enclosure, or other containment;
- (2) Ensure (by site inspection) the integrity of the enclosure or containment;
- (3) Set up procedures to control entry to and exit from the enclosure and/or area;
- (4) Supervise all employee exposure monitoring required by this section and ensure that it is conducted as required by 29 CFR 1926.1101(f);
- (5) Ensure that employees working within the enclosure and/or using glove bags wear protective clothing and respirators as required by 29 CFR 1926.1101(h) and (i);
- (6) Ensure through on-site supervision, that employees set up and remove engineering controls, use work practices and personal protective equipment in compliance with all requirements;
- (7) Ensure that employees use the hygiene facilities and observe the decontamination procedures specified in 29 CFR 1926.1101(j);
- (8) Ensure that through on site inspection engineering controls are functioning properly and employees are using proper work practices; and,
- (9) Ensure that notification requirement of 29 CFR 1926.1101(k) are met.

### Training for the Competent Person

For Class I, and II asbestos work the competent person will be trained in all aspects of asbestos removal and handling, including: abatement, installation, removal and handling; the contents of 29 CFR 1926.1101; the identification of asbestos; removal procedures, where appropriate; and other practices for reducing the hazard. Such training will be obtained in a comprehensive course for supervisors, such as a course conducted by an EPA or state approved training provider, certified by the EPA or a State, or a course equivalent in stringency, content, and length.

For Class III and IV asbestos work, the competent person will be trained in aspects of asbestos handling appropriate for the nature of the work. This will include procedures for setting up glove bags and mini enclosures, practices for reducing asbestos exposures, use of wet methods, the contents of 29 CFR

1926.1101, and the identification of asbestos. Such training will include successful completion of a course equivalent in curriculum and training method to the 16-hour Operations and Maintenance course developed by EPA for maintenance and custodial workers [See 40 CFR 763.92(a)(2)], or its equivalent in stringency, content, and length. Competent persons for Class III and IV work, may also be trained pursuant to the requirements of 29 CFR 1926.1101(o)(4)(i).

## APPENDIX A AIR SAMPLING

### 1. Method

- a. NIOSH method 7400 will be used to analyze for asbestos with qualification provided by Method 7402 with TEM analysis, if necessary.
- b. In Method 7400, air is drawn through a Mixed Cellulose Ester Filter (SKC Part number 225-312A or equivalent) at a rate of 2.0 liters per minute for shift duration sampling and 2.5 liters per minute for 30-minute sampling. Shift duration sampling periods will be a minimum of 7.5 hours. After four hours of sampling, filters will be examined and if notable loading is seen, a new filter will be used to complete the sampling. This will result in splitting the sampling period. The results of the two filters will be combined to calculate the TWA.
- c. The preferred collection device will be a 25 mm diameter cassette with an open-faced 50 mm electrically conductive extension cowl (SKC Part number 225321 or equivalent). The 37 mm cassette may be used if necessary, but only if written justification accompanies the sample results in the employee's exposure monitoring record. Cassettes for asbestos sample collection are not reused or reloaded.
- d. Personnel air sampling pumps capable of sustaining the 2.0 l/m flow rate required for eight hours will be used to collect the samples.
- e. Air sampling pumps and a representative filter train will be calibrated prior to and following sampling. A Bios Dry Calibrator or equivalent will be used. A minimum of three trials with flow rates within 10% of each other will be required for a valid calibration.
- f. Where possible, a sufficient air volume for each air sample will be collected to yield between 100 and 1,300 fibers per square millimeter on the membrane filter. If a filter darkens in appearance or if loose dust is seen on the filter, a second sample will be started.
- g. Samples are shipped in a rigid container with sufficient packing material to prevent dislodging the collected fibers. Packing material that has a high electrostatic charge on its surface (e.g., expanded polystyrene) is not used as such material can cause loss of fibers to the sides of the cassette.
- h. Personal samples are taken in the "breathing zone" of the employee (i.e., attached to or near the collar or lapel near the worker's face).

### 2. Initial Air Sampling

- a. WESTON will ensure, for all Class I and II operations, daily monitoring representative of the exposure of each employee who is assigned to work within a regulated area will be conducted unless a negative exposure assessment for the entire operation has been made.
- b. WESTON will ensure that periodic monitoring of all work where exposures are expected to exceed a PEL, is conducted at intervals sufficient to document the validity of the exposure prediction for all operations other than Class I and II operations.
- c. Exception: When all employees required to be monitored daily are equipped with supplied-air respirators operated in the positive-pressure mode, WESTON may dispense with the daily monitoring required by this paragraph. However, employees performing Class I work using a control method which is not listed in 29 CFR 1926.1101(g)(4) (i), (ii), or (iii) or using a modification of a listed control method, will continue to be monitored daily even if they are equipped with supplied-air respirators.

### **3. Termination of Monitoring**

- a. If the periodic monitoring required by 29 CFR 1926.1101(f)(3) reveals that employee exposures, as indicated by statistically reliable measurement, are below the permissible exposure limit (PEL) and excursion limit WESTON may discontinue monitoring for those employees whose exposures are represented by such monitoring.
- b. Additional monitoring will be provided whenever there has been a change in: process, control equipment, personnel or work practices that may result in new or additional exposures above the PEL and/or excursion limit. Additional monitoring will also be provided when WESTON has any reason to suspect that a change may result in new or additional exposures above the PEL and/or excursion limit. Such additional monitoring is required regardless of whether a "negative exposure assessment" was previously produced for a specific job.

### **4. Analysis**

WESTON will use site personnel trained in NIOSH METHOD 7400 analysis, internal laboratories or will contract with laboratories that are AIHA Accredited for Asbestos Analysis. The competent person on each WESTON asbestos project is responsible for confirming the use of analytical protocols and quality control procedures, such as those provided in Appendix C.

## APPENDIX B CONTENT OF ASBESTOS MEDICAL EXAMINATIONS

The Initial, Periodic, and Exit Protocols for medical examinations of WESTON employees conducting asbestos work (as developed by WESTON's medical contractor) follow:

<b>CLEARANCES-BASELINE</b>	<b>History Questionnaire *</b>	<b>Physical Exam</b>	<b>Blood Chemistry</b>	<b>Spirometry</b>	<b>Chest X-ray</b>	<b>Audiogram</b>	<b>EKG</b>
Asbestos/Respirator	X	X	X	X	FX#	X	X
CalOSHA/Asb/Haz/Resp	X	X	X	X	CX#	X	X
Asbestos/Haz/Respirator	X	X	X	X	FX#	X	X
<b>ANNUAL</b>	<b>History Questionnaire</b>	<b>Physical Exam</b>	<b>Blood Chemistry</b>	<b>Spiro</b>	<b>Chest X-ray</b>	<b>Audiogram</b>	<b>EKG</b>
Asbestos/Respirator	X	X	X	X	F#	X	@
CalOSHA/Asb/Haz/Resp	X	X	X	X	C#	X	@
Asbestos/Haz/Respirator	X	X	X	X	F#	X	@
Respirator Only	X	X		X		X	
<b>EXIT</b>	<b>History Questionnaire</b>	<b>Physical Exam</b>	<b>Blood Chemistry</b>	<b>Spiro</b>	<b>Chest X-ray</b>	<b>Audiogram</b>	<b>EKG</b>
Asbestos/Respirator	X	X	X	X	X#	X	
CalOSHA/Asb/Haz/Resp	X	X	X	X	CX#	X	
Asbestos/Haz/Respirator	X	X	X	X	FX#	X	

a = Questionnaires required by 29 CFR 1926.1101 Appendix D

@ = Performed for those 40 and older or if medically indicated

X = Components included in protocol.

X-ray with ILO interpretation

F = 1-view chest X-ray will be performed on all asbestos baseline and exit exams

Frequency of chest X-ray with annual exams will be based on age & years since first asbestos exposure

C = 2-view chest X-ray will be performed on all asbestos baseline and exit exams

Frequency of chest X-ray with annual exams will be based on age & years since asbestos first exposure

## APPENDIX C ANALYTICAL REQUIREMENTS

1. Fiber counts are made by positive phase contrast using a microscope with an 8 to 10 X eyepiece and a 40 to 45 X objective for a total magnification of approximately 400 X and a numerical aperture of 0.65 to 0.75. The microscope is also fitted with a green or blue filter.
2. Microscopes are fitted with a Walton-Beckett eyepiece graticule calibrated for a field diameter of 100 micrometers (+/-2 micrometers).
3. The phase-shift detection limit of the microscope is maintained at about 3 degrees measured using the HSE phase shift test slide as outlined below.
  - a. Place the test slide on the microscope stage and center it under the phase objective.
  - b. Bring the blocks of grooved lines into focus.

Note: The slide consists of seven sets of grooved lines (approximately 20 grooves to each block) in descending order of visibility from sets 1 to 7, with 7 being the least visible. The requirements for asbestos counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope that fails to meet these requirements has either too low or too high a resolution to be used for asbestos counting.

- c. If the image deteriorates, clean and adjust the microscope optics. If the problem persists, consult the microscope manufacturer.
4. Each set of samples taken include 10% field blanks or a minimum of 2 field blanks. These blanks come from the same lot as the filters used for sample collection. The field blank results will be averaged and subtracted from the analytical results before reporting. A set consists of any sample or group of samples for which an evaluation for this standard must be made.

Any samples represented by a field blank having a fiber count in excess of the detection limit of the method being used will be rejected.

5. The samples are mounted by the acetone/triacetin method or a method with an equivalent index of refraction and similar clarity.
6. The following counting rules are observed.
  - a. Count only fibers equal to or longer than 5 micrometers. Measure the length of curved fibers along the curve.
  - b. In the absence of other information, count all particles as asbestos that have a length-to-width ratio (aspect ratio) of 3:1 or greater.
  - c. Fibers lying entirely within the boundary of the Walton-Beckett graticule field will receive a count of 1. Fibers crossing the boundary once, having one end within the circle, will receive the count of one half ( 1/2). Any fiber that crosses the graticule boundary more than once is not counted, even though visible fibers are not counted if they are outside the graticule area.
  - d. Bundles of fibers are counted as one fiber unless individual fibers can be identified by observing both ends of an individual fiber.
  - e. Enough graticule fields are counted to yield 100 fibers. Count a minimum of 20 fields; stop counting at 100 fields regardless of fiber count.
7. Blind recounts will be conducted at the rate of 10 percent.

## **Quality Control Procedures**

### **Criteria for selecting Asbestos analytical Laboratory or Performing On-site Analysis**

1. Intra-laboratory program. Each laboratory and/or each company with more than one microscopist counting slides will establish a statistically designed quality assurance program involving blind recounts and comparisons between microscopists to monitor the variability of counting by each microscopist and between microscopists. In a company with more than one laboratory, the program will include all laboratories, and will also evaluate the laboratory to laboratory variability.
2. Inter-laboratory program. Each laboratory analyzing asbestos samples for compliance determination will implement an inter-laboratory quality assurance program that, as a minimum, includes participation of at least two other independent laboratories. Each laboratory will participate in round robin testing at least once every 6 months with at least all the other laboratories in its inter-laboratory quality assurance group. Each laboratory will submit slides typical of its own workload for use in this program. The round robin will be designed and results analyzed using appropriate statistical methodology.
3. All laboratories should also participate in a national sample testing scheme such as the Proficiency Analytical Testing Program (PAT), or the Asbestos Registry sponsored by the American Industrial Hygiene Association (AIHA).
4. All individuals performing asbestos analysis must have taken the NIOSH course for sampling and evaluating airborne asbestos dust or an equivalent course.
5. When the use of different microscopes contributes to differences between counters and laboratories, the effect of the different microscope will be evaluated and the microscope will be replaced, as necessary.
6. Current results of these quality assurance programs will be posted in each laboratory to keep the microscopists informed.

## **APPENDIX D ASBESTOS INFORMATION**

### **Substance Technical Information for Asbestos - Non-Mandatory (Appendix G to 29 CFR 1910.1001)**

#### **1. Substance Identification**

- a. Substance: "Asbestos" is the name of a class of magnesium silicate minerals that occur in fibrous form. Minerals that are included in this group are chrysotile, crocidolite, amosite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos.
- b. Asbestos are used in the manufacture of heat resistant clothing, automotive brake and clutch linings, and a variety of building materials including floor tiles, roofing felts, ceiling tiles, asbestos cement pipe and sheet, and fire resistant drywall. Asbestos is also present in pipe and boiler insulation materials, and in sprayed on materials located on beams, in crawlspaces, and between walls.
- c. The potential for a product containing asbestos to release breathable fibers depends on its degree of friability. Friable means that the material can be crumbled with hand pressure and is therefore likely to emit fibers. The fibrous or fluffy sprayed on materials used for fireproofing, insulation, or sound proofing are considered to be friable, and they readily release airborne fibers if disturbed. Materials such as vinyl asbestos floor tile or roofing felts are considered non-friable and generally do not emit airborne fibers unless subjected to sanding or sawing operations. Asbestos cement pipe or sheet can emit airborne fibers if the materials are cut or sawed, or if they are broken during demolition operations.
- d. Permissible exposure: Exposure to airborne asbestos fibers may not exceed 0.1 fibers per cubic centimeter of air (0.1 f/cc) averaged over the 8 hour workday.

#### **2. Health Hazard Data**

- a. Asbestos can cause disabling respiratory disease and various types of cancers if the fibers are inhaled. Inhaling or ingesting fibers from contaminated clothing or skin can also result in these diseases. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.
- b. Exposure to asbestos has been shown to cause lung cancer, mesothelioma, and cancer of the stomach and colon. Mesothelioma is a rare cancer of the thin membrane lining of the chest and abdomen. Symptoms of mesothelioma include shortness of breath, pain in the walls of the chest, and/or abdominal pain.

#### **3. Respirators and Protective Clothing**

- a. Respirators: You are required to wear a respirator when performing tasks that result in asbestos exposure that exceeds the permissible exposure limit (PEL) of 0.1 f/cc. These conditions can occur while your employer is in the process of installing engineering controls to reduce asbestos exposure, or where engineering controls are not feasible to reduce asbestos exposure. Air-purifying respirators equipped with a high-efficiency particulate air (HEPA) filter can be used where airborne asbestos fiber concentrations do not exceed 1.0 f/cc; otherwise, air-supplied, positive-pressure, full face piece respirators must be used.

Disposable respirators or dust masks are not permitted to be used for asbestos work. For effective protection, respirators must fit your face and head snugly. Your employer is required to conduct fit tests when you are first assigned a respirator and every 6 months thereafter. Respirators should not be loosened or removed in work situations where their use is required.

- b. Protective Clothing: You are required to wear protective clothing in work areas where asbestos fiber concentrations exceed the PEL of 0.1 f/cc to prevent contamination of the skin. Where protective clothing is required, your employer must provide you with clean garments. Unless you are working on a large asbestos removal or demolition project, your employer must also provide a change room and separate lockers for your street clothes and contaminated work clothes.
  - c. If you are working on a large asbestos removal or demolition project, and where it is feasible to do so, your employer must provide a clean room, shower, and decontamination room contiguous to the work area. When leaving the work area, you must remove contaminated clothing before proceeding to the shower. If the shower is not adjacent to the work area, you must vacuum your clothing before proceeding to the change room and shower. To prevent inhaling fibers in contaminated change rooms and showers, leave your respirator on until you leave the shower and enter the clean change room.
4. Disposal Procedures and Cleanup
- a. Wastes that are generated by processes where asbestos are present include:
    - (1) Empty asbestos shipping containers.
    - (2) Process wastes such as cuttings, trimmings, or reject material.
    - (3) Housekeeping waste from sweeping or vacuuming.
    - (4) Asbestos fireproofing or insulating material that is removed from buildings.
    - (5) Building products that contain asbestos removed during building renovation or demolition.
    - (6) Contaminated disposable protective clothing.
  - b. Empty shipping bags can be flattened under exhaust hoods and packed into airtight containers for disposal. Empty shipping drums are difficult to clean and should be sealed.
  - c. Vacuum bags or disposable paper filters should not be cleaned, but should be sprayed with a fine water mist and placed into a labeled waste container.
  - d. Process waste and housekeeping waste should be wetted with water or a mixture of water and surfactant prior to packaging in disposable containers.
  - e. Material containing asbestos that is removed from buildings must be disposed of in leak tight 6 mil thick plastic bags, plastic lined cardboard containers, or plastic lined metal containers. These wastes, which are removed while wet, should be sealed in containers before they dry out to minimize the release of asbestos fibers during handling.
5. Access to Information
- a. Each year, your employer is required to inform you of the information contained in this standard and appendices for asbestos. In addition, your employer must instruct you in the proper work practices for handling materials containing asbestos, and the correct use of protective equipment.
  - b. Your employer is required to determine whether you are being exposed to asbestos. You or your representative has the right to observe employee measurements and to record the results obtained. Your employer is required to inform you of your exposure, and, if you are exposed above the permissible limit, he or she is required to inform you of the actions that are being taken to reduce your exposure to within the permissible limit.
  - c. Your employer is required to keep records of your exposures and medical examinations. These exposure records must be kept for at least thirty (30) years. Medical records must be kept for the period of your employment plus thirty (30) years.
  - d. Your employer is required to release your exposure and medical records to your physician or designated representative upon your written request.

### **Definitions**

**Aggressive method** means removal or disturbance of building material by sanding, abrading, grinding or other method that breaks, crumbles, or disintegrates intact asbestos containing material (ACM).

**Amended water** means water to which surfactant (wetting agent) has been added to increase the ability of the liquid to penetrate ACM.

**Asbestos** means chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that have been chemically treated and/or altered.

**Asbestos containing material (ACM)** means any material containing more than 1% asbestos.

**Assistant Secretary** means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

**Authorized person** means any person authorized by the employer and required by work duties to be present in regulated areas.

**Class I asbestos work** means activities involving the removal of thermal system insulation (TSI) and surfacing ACM and presumed asbestos containing material (PACM).

**Class II asbestos work** means activities involving the removal of ACM which is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

**Class III asbestos work** means repair and maintenance operations, where ACM, including thermal system insulation and surfacing material, is likely to be disturbed.

**Class IV asbestos work** means maintenance and custodial activities in which employees contact ACM and PACM. Activities to clean up waste and debris containing ACM and PACM.

**Building/facility owner** is the legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building and/or facility in which activities covered by this standard take place.

**Certified Industrial Hygienist (CIH)** means one certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

**Clean room** means an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

**Closely resemble** means that the major workplace conditions which have contributed to the levels of historic asbestos exposure are no more protective than conditions of the current workplace.

**Competent person** means in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f). In addition, for Class I and Class II work one who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA

requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2).

**Critical barrier** means one or more layers of plastic sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

**Decontamination area** means enclosed areas adjacent and connected to regulated areas (consist of an equipment room, shower area, and clean room), used for decontamination of workers, materials, and equipment that are contaminated with asbestos.

**Demolition** means the wrecking or taking out of any load supporting structural member and any related razing, removing, or stripping of asbestos products.

**Director** means the Director, National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

**Disturbance** means contact which releases fibers from ACM or PACM or debris containing ACM or PACM. This term includes activities that disrupt the matrix of ACM or PACM, render ACM or PACM friable, or generate visible debris.

- Disturbance includes cutting away small amounts of ACM and PACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component.

In no event will the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or waste bag which will not exceed 60 inches in length and width.

**Employee exposure** means that exposure to airborne asbestos that would occur if the employee was not using respiratory protective equipment.

**Equipment room (change room)** means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

**Fiber** means a particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

**Filtering facepiece (dust mask)** means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

**Glove-bag** means not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

**High-efficiency particulate air (HEPA) filter** means a filter capable of trapping and retaining at least 99.97% of all mono-dispersed particles of 0.3 micrometers in diameter.

**Homogeneous area** means an area of surfacing material or thermal system insulation that is uniform in color and texture.

**Industrial hygienist** means a professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

**Intact** means that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that it is no longer likely to be bound with its matrix.

**Modification** means a changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system. Omitting a procedure or component, or reducing or diminishing the stringency or strength of a material or component of the control system is not a "modification" for purposes of 29 CFR 1926.1101(g)(6)(ii).

**Negative Initial Exposure Assessment** means a demonstration by the employer, which complies with the criteria in 29 CFR 1926.1101(f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PELs.

**Presumed Asbestos Containing Material (PACM)** means thermal system insulation and surfacing material found in buildings constructed no later than 1980. The designation of a material as "PACM" may be rebutted pursuant to 29 CFR 1926.1101(k)(5).

**Project Designer** means a person who has successfully completed the training requirements for an abatement project designer established by 40 U.S.C. 763.90(g).

**Regulated area** means an area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limits; also an area established by the employer to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit. Requirements for regulated areas are set out in 29 CFR 1926.1101(e)(6).

**Removal** means all operations where ACM and/or PACM are taken out or stripped from structures or substrates, and includes demolition operations.

**Renovation** means the modifying of any existing structure, or portion thereof.

**Repair** means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

**Surfacing material** means material that is sprayed, troweled on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

**Surfacing ACM** means surfacing material which contains more than 1% asbestos.

**Thermal system insulation (TSI)** means ACM applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.

**Thermal system insulation ACM** is TSI which contains more than 1% asbestos.

**WESTON** means WESTON Solutions Inc or subcontractors to WESTON or subcontractors for whom WESTON is responsible.

## **FLD 58 DRUM HANDLING OPERATIONS**

### **REFERENCES**

29 CFR 1910.120 and 29 CFR 1926.65 – Occupational Safety and Health Administration (OSHA)  
40 CFR Parts 264, 265 and 311 – U.S. Environmental Protection Agency (EPA)  
49 CFR Parts 171 through 178 – U.S. Department of Transportation (DOT)  
USACE EM 385-1-1 – U.S. Army Corps of Engineers

### **RELATED FLDs**

*FLD 08 – Confined Space Entry Program*

*FLD 40 – Storage Tank Removal and Decommissioning*

One of the most hazardous operations to be conducted at any hazardous waste site is the handling of drums and other containers. Container contents cannot be relied upon to be the same as existing markings. Extreme caution is necessary for the safety of site workers, the public and the environment.

Accidents have occurred during the handling of drums and other containers. Hazards associated with drum or other container handling include; fires, explosions, vapor releases, spills and injuries from lifting or other physical hazards associated with moving containers. In order to increase employee safety when container movement or handling is anticipated, strict guidelines that limit the numbers of personnel exposed to drum/container handling hazards are necessary.

This FLD identifies generic safety guidance for those activities involving drum handling at hazardous waste operations. Site-specific criteria must be included in any health and safety plan (HASP) to anticipate potential hazards associated with drum handling task.

Various standards are in effect for the movement and handling of drums and other containers. Site-specific HASPs must anticipate and follow the standards referenced as related to site activities.

### **GENERAL**

Hazardous substances, contaminated liquids, and other residues will be handled, transported, labeled, and disposed of in accordance with this FLD and applicable regulatory standards.

Drums and containers used during remediation activities must meet the appropriate DOT, OSHA, and EPA regulations for the wastes or materials that they contain.

When practical, drums and containers are to be inspected and their integrity ensured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (e.g., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile) will be moved to an accessible location and inspected prior to further handling.

Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

Site operations must be organized to minimize the amount of drum or container movement.

Fire extinguishing equipment will be on hand and ready for use to control incipient fires.

Level B protective equipment must be used as a minimum unless available evidence/research indicates that a lower level of protection is safe or a higher level of protection is necessary.

#### **Locating and Inspecting Drums/Containers - Minimal Criteria**

Review background data and site history to determine types and location of containers either known or suspect.

Conduct geophysical surveys utilizing devices such as, ground-penetrating system or other type of detection system or device to estimate the location and depth of buried drums or containers..

Monitor the site utilizing appropriate direct-reading instrumentation to verify the presence of potential volatile materials.

For visible containers, approach containers cautiously and in appropriate levels of protection based upon available evidence. Continue air monitoring with direct-reading instruments following appropriate action levels.

Visually determine container integrity and observe for signs of current or historic leakage.

#### **Container Movement and Handling - Minimal Criteria**

Implement a spill containment plan prior to any container movement. This plan must include, at a minimum, provisions for appropriate types and numbers of over-pack containers, absorbent, tools and other emergency equipment determined to be necessary. Personnel must be instructed in procedures to follow in the event of a spill.

Monitor containers utilizing the appropriate direct-reading instruments for each container to verify potential leakage and employee exposure to contents.

Perform excavation activities carefully to avoid the possibility of rupturing any containers. Excavation activities must be in compliance with 29 CFR 1926 Subpart P (Excavations).

Prior to movement of drums or containers, brief all employees exposed to the transfer operation on the potential hazards associated with the contents of the drums or containers.

Empty all drums and containers that cannot be moved without rupture, leaking, or spills. Drums or containers will be emptied into a sound container using a device classified for the material being transferred.

Move and handle containers preferably using a drum grapppler. Other means of handling must be justified in the HASP. Movement by hand is to be offered as a last resort.

Overpack damaged containers or those with suspect integrity or transfer contents to appropriate containers prior to movement (if safe to do so). Proper assessment of contents must be made prior to transfer. Proper grounding and bonding techniques must be followed.

Use blast shields on excavation and container handling equipment unless the hazard and risk assessment indicates it is safe to perform the operation without blast shields.

If drums are to be moved utilizing drum slings, yokes, or other accessories, ensure that workers move away from the area after affixing the accessory and prior to drum movement by the equipment operator.

Do not move critically swollen containers by hand. Pressure is to be safely relieved prior to movement unless movement is by grapples and properly protected equipment operator.

Remotely handle containers suspected of containing explosive or reactive materials.

#### **Drum Staging, Opening, and Sampling - Minimal Criteria**

Identify staging areas prior to container movement. Based upon the perceived risk from container contents, the staging area must be remote from other site activities.

Ensure that minimal and appropriate equipment (e.g., fire protection, spill control and containment, PPE) is available at the staging area.

Stage compressed gas cylinders in a shaded area.

Remotely handle potentially reactive, explosive, or shock-sensitive containers and stage them separate from other containers.

Stage containers to allow ease in sampling, appropriate aisle space and the avoidance of cross-contamination or reaction during opening activities.

Ensure that employees do not stand upon or work from drums or containers.

Open all drums and containers in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, ensure that appropriate shielding is placed between the employee and the drums or containers to reduce the risk of injury.

Ensure that material handling equipment used to transfer drums and containers is selected, positioned and operated to minimize the potential for sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers.

Do not handle drums and containers containing radioactive wastes until appropriate clearance is obtained in writing from the Corporate Radiation Safety Officer, Corporate Health and Safety Director, or designee.

Use only spark-proof tools in drum opening operations.

Perform sampling of containers and drums in accordance with a sampling plan prepared as a part of the site-specific HASP.

As a minimum, take the following special precautions when handling drums and containers containing or suspected of containing shock-sensitive wastes:

- All non essential employees will be evacuated from the area of transfer.
- Material handling equipment will be provided with explosive containment devices or protective shields to protect equipment operators from the potential of exploding containers.

- An employee alarm system capable of being heard or seen above surrounding light and noise conditions will be used to signal the commencement and completion of explosive waste handling activities.
- Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) will be maintained between the employee in charge of the immediate handling area and both the field safety officer and the command post until such time as the handling operation is completed.
- Communication equipment or methods that could cause shock sensitive materials to explode will not be used.
- Drums and containers under pressure, as evidenced by bulging or swelling, will not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.
- Drums and containers containing packaged laboratory wastes will be considered to contain shock sensitive or explosive materials until they have been characterized.

#### **Laboratory Waste Packs (Lab Packs)**

In addition to the requirements outlined for shock sensitive wastes, the following precautions will be taken at a minimum when handling laboratory waste packs (lab packs):

- Lab packs will be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.
- If crystalline material is noted on any container, the contents will be handled as a shock sensitive waste until the contents are identified.
- Remote opening of Lab Pack containers is the preferred technique.
- Manual opening lab packs must be approved in the HASP based upon appropriate hazard analysis.

#### **Consolidation and Re-containerization - Minimal Criteria**

Segregate containers based upon on-site compatibility testing.

Promptly clean up any spillage to preclude inadvertent reactions or cross-contamination.

Perform bulking of materials only after appropriate compatibility testing.

Ensure that drums and other repackaging containers meet DOT criteria for the hazard class of the material.

#### **Interim Storage and Transportation - Minimal Criteria**

Ensure that Interim Storage areas are in compliance with EPA standards for container storage.

Inspect storage areas weekly, at a minimum. The criteria outlined in 40 CFR Part 265 will be utilized as guidance.

Ensure that adequate aisle space is maintained for worker protection in the storage area.

Ensure that containers are protected (as necessary) from adverse weather conditions. Containers of compressed gasses or reactive or explosive materials should be protected from environmental conditions by covers or shades.

Ensure that fire extinguishers and eye wash stations are available near the storage area.

Ensure that adequate spill control equipment is available near the storage area.

Transport containers according to appropriate USDOT and USEPA regulations.

#### **Tank and Vault Procedures**

Tanks and vaults containing hazardous substances must be handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault as well as FLD 40.

Appropriate tank or vault entry procedures must be in compliance with FLD 08, Confined Space Entry Program.

### Summary of Safety Precautions for Drum, Cylinder, and Unknown Container Handling

<b>ACTIVITY:</b> Locating Containers and Conducting Inventory	
<b>POTENTIAL SAFETY HAZARD:</b> Unknown location and contents of drums can lead to unsuspected hazards.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Carefully review background data pertaining to the location and types of wastes on-site.</li> <li>• Conduct visual to minimize the possibility of puncturing drums. A spotter should be utilized to identify drums during excavation activities.</li> <li>• During the random sampling of containers, which may be required for an inventory, spacing between containers should be adequate to allow for emergency evacuation if needed.</li> <li>• Use remotely operated, non-sparking tools for random sampling whenever possible.</li> <li>• Use direct-reading air monitoring equipment to detect hot spots where contamination may pose a risk to worker safety.</li> </ul>
<b>ACTIVITY:</b> Determining Container Integrity	
<b>POTENTIAL SAFETY HAZARD:</b> The process of visual inspections requires close contact with containers of unknown content.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Approach container cautiously. Conduct air monitoring to indicate levels of hazards that require withdrawal from the work area or use of additional safety equipment.</li> <li>• Any container that is critically swollen should not be approached without proper PPE. It should be isolated using a barricade until the pressure can be relieved remotely.</li> <li>• Use of the grapples or other remotely operated equipment can eliminate the need for determining container integrity prior to excavation, provided that rupture of the container will not result in fire or unacceptable environmental impact.</li> </ul>
<b>ACTIVITY:</b> Container Excavation and Handling	
<b>POTENTIAL SAFETY HAZARD:</b> Exposure to toxic/hazardous vapors; rupture of containers.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Where buried drums are suspected, conduct a visual survey before using any construction equipment in order to minimize the possibility of rupture. (If practical, a geophysical survey could be used prior to excavation.)</li> <li>• Use a container grapples where possible and cost-effective to minimize contact with containers. If a grapples is not available, pump or over pack drums of poor integrity before excavation.</li> <li>• Ground equipment prior to transferring wastes to new containers.</li> <li>• Use non-sparking hand tools and non-sparking bucket teeth on excavation equipment, and use Plexiglas shields on vehicle cabs.</li> <li>• Where slings, yokes, or other accessories must be used, workers should back away from the work area after attaching the accessory and before the container is lifted.</li> <li>• Critically swollen or bulging drums should not be handled until pressure can be relieved.</li> <li>• Use bars that fit over the teeth of excavation buckets to prevent container puncture.</li> <li>• Where ionizing levels of radiation are detected, the Field Safety Officer and Site Radiological Control Technician should be contacted and the work activity should stop.</li> <li>• Where explosive or shock-sensitive material is suspected, every effort should be made to handle the container remotely. Gas cylinders should not be dragged during handling.</li> <li>• Use direct-reading air monitoring equipment when in close proximity to containers to detect any hot spots.</li> </ul>

<b>ACTIVITY:</b> Container Staging and Opening	
<b>POTENTIAL SAFETY HAZARD:</b> Release of toxic, hazardous vapors, rupture of containers.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Stage gas cylinders in a cool, shaded area.</li> <li>• Stage potentially explosive or shock-sensitive wastes in a diked, fenced area.</li> <li>• Use remote container opening methods where containers are determined to be unsound.</li> <li>• Conduct remote-operated container opening form behind a barricade or behind a Plexiglas shield if backhoe-mounted puncture is being used.</li> <li>• Isolate container opening from staging and other activities if possible to prevent a chain reaction if an explosion or reaction does occur.</li> <li>• If container opening cannot be isolated from staging, containers should be staged so as to: (1) minimize the possibility of chain reactions in the event of a fire or explosion; and (2) provide adequate space for emergency evacuation.</li> <li>• Use only non-sparking hand tools if containers are to be opened manually.</li> <li>• Remotely relieve the pressure of critically swollen containers before opening.</li> <li>• Clean up spills promptly to minimize mixing of incompatible materials (Use the SPCCP for guidance.)</li> </ul>
<b>ACTIVITY:</b> Consolidation and Recontainerization	
<b>POTENTIAL SAFETY HAZARD:</b> Mixing of incompatible wastes.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Perform on-site compatibility or HAZCAT testing on all containers.</li> <li>• Segregate wastes according to compatibility class following compatibility testing.</li> <li>• Clean up spills promptly to avoid mixing or incompatible wastes.</li> <li>• Intentional mixing of incompatible wastes such as acids and bases should be performed under controlled conditions in a reaction tank where temperature and vapor release can be monitored.</li> <li>• Monitor for incompatible reactions during consolidation using direct-reading air monitoring equipment.</li> </ul>
<b>ACTIVITY:</b> Interim storage and transportation.	
<b>POTENTIAL SAFETY HAZARD:</b> Mixing of incompatible wastes.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Segregate incompatible wastes using dikes during interim storage.</li> <li>• Maintain a weekly inspection schedule.</li> <li>• Allow adequate aisle space between containers to allow rapid exit of workers in case of emergency.</li> <li>• Keep explosives and gas cylinders in a cool, shaded, or roofed area.</li> <li>• Prevent contact of water reactive wastes with water.</li> <li>• Clean up spills or leaks promptly.</li> <li>• Have fire fighting equipment readily available within the storage area.</li> <li>• Ensure adherence to DOT regulations regarding transport of incompatible wastes and container integrity.</li> </ul>

## **FLD 61 GASOLINE CONTAMINANT EXPOSURE**

### **RELATED FLDs**

#### *FLD54 – Benzene Exposure Control Plan*

**Note:** This FLD replaces the Benzene Guideline from the 2003 Safety Officer Manual. Use of the previous Benzene Guideline is no longer valid or authorized.

If gasoline contamination is a concern, there may be the potential for benzene to be present in the breathing zone at concentrations reaching or exceeding the OSHA Permissible Exposure Level (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV). A determination of the magnitude of worker exposure must be made to allow use of this guideline and of the applicability of the gasoline TLV/Time Weighted Average (TWA) or establish the need to follow the OSHA Benzene exposure requirements (29 CFR 1910.1028 and FLD 54).

Actions for this guide are based upon the ACGIH TLV/TWA for Gasoline of 300 ppm.

Assume worst case as 5% benzene by volume in gasoline, therefore “units” as measured by a photoionization detector (PID) or flame ionization detector (FID) can be paired with Levels of Protection (LOP) as follows:

0-10 units	=	Level D (at 10 units see below)
10-150 units (benzene less than 0.5 ppm)	=	Level D
150-250 units (benzene less than 0.5 ppm)	=	Level C
250 units or greater (benzene less than 0.5 ppm)	=	Level B

### **Monitoring Requirements**

A properly calibrated PID or FID must be used to monitor exposure. At 10 units site personnel must evaluate the potential for benzene-specific exposure. The RAE Systems UltraRAE with the RAE-SEP benzene tubes (see RAE Systems Guide TN-127) is the PID of choice as cross-sensitivities are eliminated or greatly minimized. The LOP identified above may be used provided benzene exposures remain below 0.5 ppm.

An alternative, but less accurate procedure using colorimetric chemical detector tubes (Dräger benzene 0.5/c or equivalent tube) may be used to quantify benzene concentration. If less than 0.5 ppm, continue with LOP as above.

RAE-SEP tube or colorimetric tube readings must be made and documented at 60 minute (maximum) intervals during exposure situations when the PID/FID readings are 10 units or greater.

**If benzene exposures are equal to, or greater than 0.5 ppm, compliance with FLD 54 and OSHA's Benzene standard (29 CFR 1910.1028) is required.**

For Level C operations, a full-face air-purifying respirator must be used. Cartridges must be changed at end of service life or at no greater than 4-hour periods.

All air monitoring needs to be conducted within the employee's breathing zone.